

THE DOCK & HARBOUR AUTHORITY

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THE PORT OF GALATZ.

The Supplement this month is devoted to the Port of Galatz, described in the second of the series of articles on the Ports of Rumania, which appears in this issue. Galatz, latitude 45 deg. 27 mins. N., longitude 28 deg. 2 mins. E., is situated in Moldavia, about 82 miles from the mouth of the Danube.

In common with Giurgiu and Braila, the Port of Galatz has the characteristics of a river port distinguished by a long river frontage with stone revetments. Geographical position and depth of water, in conjunction with mechanical equipment, furthermore endow it with facilities akin to those of a sea-port. Vessels may indeed be moored along the Danube on a length of over 3,000 metres, whilst in addition there is about 1,000 metres available for this purpose at the Basinel de Lemnarie. There are six berths for sea-going steamers and twenty berths for river vessels and craft.

The Port is divided into five principal sections: the Old Port, the New Basin for general commerce, grain and lumber export, the Dock Enclosures of the Winter Port, the Industrial Port Area, and about twenty-five kilometres of the river bank available for lying alongside. The New Basin for general commerce, also known as the Basinel de Lemnarie, is under the administration of the Service Hydraulique de l'Etat Roumain, whilst the Basin Dock or Basinel Docurilor comes under the Service des Docks de Galatz, a Government organisation. A system of branch lines running partly along the Danube serves the dock area and links up with the trunk lines of the Chemin de Fer de l'Etat Roumain, which controls both. Railway sidings total 13,000 metres, of which some 5,500 metres are used for shunting. About 400 trucks can be dealt with daily.

Equipment at the main port includes two floating grain elevators with a capacity of 80 tons per hour, for loading or discharging grain from lighters to sea-going vessels, a floating crane of 40 tons capacity, and fifteen loading pontoons. At the Basin Dock there are loading platforms for lumber and coal with an area of 37,000 square metres, an electric crane of 40 tons capacity, one of nine tons, four of three tons, one of 2½ tons, and seven of 1½ tons. The port has a floating dock composed of two sections which, used jointly, can lift a vessel up to 2,000 tons displacement and 16 ft. draught.

Electricity is supplied from a power station equipped with two Diesel motors of 240 h.p. each, with dynamos respectively of 440 volts, 165 k.w. It is hoped ultimately to instal a third motor and dynamo for use as a standby, an addition which would be of particular value when demands on power supply are heavy, particularly in the summer months. Lighting throughout the dock area is by electricity.

The foreign trade of the port in 1925 showed imports of 102,000 tons, and exports 762,000 tons. Commissioner MacElwee points out in his article that the volume is comparable with that of Savannah, and Portland, Oregon, also running that of Seattle fairly close. The chief exports comprise timber, corn and other cereals, and cattle. Imports include coal, manufactured goods, textiles, jute bags, oilcake, sugar and foodstuffs.

In conclusion, it should be noted that a scheme for the establishment of a free zone is mooted. This would be established in the area of the port now occupied by the Timber Basin, marked on the right of the Supplement.

DOCK AND HARBOUR AUTHORITIES' ASSOCIATION.

The Dock and Harbour Authorities' Association has sustained a notable loss by the resignation of its distinguished President, Sir Hugh Bell, which was announced at the annual meeting on February 23rd. Sir Hugh had been associated with the

organisation as chairman of the executive committee since its formation until 1927, when he was elected President.

Lord Ritchie of Dundee, chairman of the Port of London Authority, moving an expression of regret at the resignation of the president, said that the services Sir Hugh Bell had rendered to the docks and harbours of the country extended over a period long before the formation of the association. He was chairman of the committee which negotiated the War agreement with the Government in regard to the payment of rates and dues, and he also drew up the permanent post-war agreement with the Government on the same matter. His services to them in other directions had also been many and valuable.

The Annual Report of the Association which appears in detail on another page states that the Association comprises forty-five authorities dealing with seventy-one per cent. of the total tonnage of vessels with cargoes arriving and departing from ports in the United Kingdom.

SWANSEA DOCKS POSTER.

The Great Western Railway Company, owners of the largest dock system in the world, has issued a panoramic poster in colours, illustrating the Swansea Docks.

The production, which is of high pictorial merit, has succeeded in combining detail in respect of staiths, cranes, rail lay-out, and other equipment with an artistic appeal which is likely to compel the attention of all those who see the poster.

MADRAS DISCHARGING FEATS.

The *Madras Mail* writes that with reference to a recent paragraph in that journal describing a rapid discharging feat in which 2,000 tons of nitrate of soda were discharged from the s.s. *Laguna* in two days at Barrow Docks, yet more remarkable feats have been performed in Madras.

On June 4th, 1925, the s.s. *Sweden Maru* discharged 1,750 tons of sugar in Madras in only 10½ hours. Other instances of quick discharge in one day include 1,304 tons, 1,404 tons and 1,695 tons taken from vessels in Madras during the past year.

The *Madras Mail* adds: It will be seen that Madras discharging records will bear comparison with those of any port in the world.

BELFAST HARBOUR IMPROVEMENTS.

The Belfast Commissioners have decided to extend the shed on the West Quay and the Dufferin Dock towards the water-side, by means of a bay approximately 614 ft. by 71 ft., and have recently placed a contract for carrying out this work, with a local firm.

The Commissioners have also decided to improve the layout of the Albert Quay, which is primarily used in connection with the coal import trade, with a view to providing more quay space and of expediting the discharge of cargo by means of an installation of electric cranes to replace the existing steam cranes.

Accommodation for the increasing cross-channel passenger and cargo service has also been under consideration, and to meet the shipowners' requirements a large portion, viz., 965 ft., of the commodious sheds on the Donegall Quay is in process of being extended to give an additional width of 15 ft., and concrete tracks to facilitate the trucking of goods in these sheds are being provided.

The Hamilton Graving Dock pumping machinery has been replaced by modern electrically-driven pumps, capable of dealing with 10,000 gallons per minute.

IMPORTANT APPOINTMENT AT LLOYD'S.

The General Committee of Lloyd's Register of Shipping at their Meeting on February 2nd conferred the vacant position of Chief Ship Surveyor to the Society upon Mr. James Montgomery, D.Sc., who has for some time held the important post of Assistant to the Chief Ship Surveyor and Principal Surveyor for Scotland.

Dr. Montgomery has had a distinguished career which augurs well for his success in his new office.

He served his apprenticeship with Messrs. William Denny and Brothers, Dumbarton, where his abilities received every encouragement in connection with the highly varied and scientific work for which that firm is noted, and at the Technical College which he attended at this time he was placed first in the Honours Class in Naval Architecture.

In 1897, at the examination of the Board of Education in Naval Architecture, Mr. Montgomery took first place in First class Honours in the United Kingdom.

He joined the staff of Lloyd's Register as a ship surveyor in 1901, and after a short service in the Glasgow office was transferred to the staff of the Chief Ship Surveyor in London, where he was employed for a time in various scientific investigations rendered necessary by the revision of the Freeboard Regulations, and subsequently in dealing with the plans of new vessels.

While in London Mr. Montgomery obtained the degree of B.Sc. (Honours), his Honours subjects being Higher Theory of Structures and Strength of Materials, and in July, 1918, the degree of Doctor of Science was conferred upon him by the Senate of London University in respect of a thesis relating to the behaviour of flat plates of shipbuilding quality when exposed to fluid pressure.

In 1911, Mr. Montgomery was selected for service in the New York office of the Society with authority to pass plans of new vessels to be constructed in the United States. He returned to this country in 1914, and a year or so afterwards was appointed principal Surveyor for Scotland.

During the war he represented Lloyd's Register in the Department of the Controller General of Merchant Shipbuilding, and the services rendered by Dr. Montgomery won the warm encomiums of the late Lord Pirrie, who was at that time Controller General of Merchant Shipbuilding.

Shortly after the conclusion of the war, Dr. Montgomery was appointed assistant to the chief ship surveyor, a position which he has held until the present time. In this capacity he was closely associated with the Chief Ship Surveyor in the revision of the Society's Rules for the Construction and Classification of Steel Ships in 1921, and the preparation of Rules for Oil Tank Vessels in 1925.

Dr. Montgomery has on many occasions contributed papers to the various technical societies associated with shipbuilding, and in 1920 he was awarded the Gold Medal of the Institution of Naval Architects for a paper on "Riveted Joints." Other papers written by Dr. Montgomery are:

(1911).—"Considerations affecting local strength calculations."

(1913).—"The Design and Construction of Oil Steamers." (Institution of Engineers and Shipbuilders in Scotland).

(1915).—"The Scantlings of Light Superstructures." (Institution of Naval Architects).

AMERICAN AIRPORT SITES.

The Fact-Finding Committee on Suitable Airport Facilities for the New York Metropolitan District, representing some 24 various commercial, civic and aeronautical interests, made its report November 29th, 1927. It recommends a "general plan looking toward the development of a system, or series of airports, which may be carried out as the increasing needs of commercial aeronautics and of private flying may require." Six locations of first choice for as many areas in the Metropolitan District, where it was determined ports must of necessity be sooner or later established, and four locations of second choice were offered for consideration. The locations were selected from prospective sites submitted by private individuals and by organizations which had made a special study of our airport problem. Other available sites were located by flight over the Metropolitan area. Seventy-two sites were given consideration by the Committee.

The site of first choice in the Queens-Flushing Bay Area was a 300 acre tract one-half mile south of the proposed Rego Park Station of the Long Island Railroad. A tract of 350 acres of land located due east of College Point was second choice.

In the Newark Bay Area a thousand acres of City owned property, situated west of Port Newark Ship Canal and the Central Railroad of New Jersey, was chosen as the site of an airport for this area.

In the Bronx East River Area, 500 acres located just west of East Chester River and north of the Harlem Branch of the New York, New Haven and Hartford Railroad was recommended as first choice. As second choice, several hundred acres of land lying west of Quincy Avenue on the north bank of East River was advised.

The Hackensack Meadows area a tract of 1,280 acres north-east of Secaucus was first choice, while a smaller tract (750 acres) southwest of Secaucus was second choice. The committee urges early development of an airport in this area.

In the Jamaica Bay Area, two sites were recommended. The first was that at East Island, which was proposed some months ago by the Chief Engineer of the Board of Estimate. The second was an 800 acre tract lying north of Barren Island.

For the Wall Street-Brooklyn Area, Governor's Island was recommended.

While the Metropolitan District thus studied includes parts of two States, the Committee does not advise interstate ownership and control but rather recommends that the airports established should be owned and developed by the State in which they are located or by some political sub-division in the State.

Since the appearance of this report, several public groups have expressed themselves as differing in opinion from some of its conclusions, especially that the Middle Village site in Queens is the first and most important of the first choice sites.

The Brooklyn Chamber of Commerce advocates the immediate use of the Barren Island site until such time as the more important East Island site could be developed.

An informal committee appointed by Mayor Walker, after taking a flying trip over the sites suggested by the Fact-Finding Committee, is reported to have disapproved of the Middle Village site on account of the probable cost of condemnation, estimated \$3,000,000 to \$5,000,000 and the length of time required to carry out these proceedings. Barren Island was favoured for immediate development and Governor's Island would be used as an intermediate field. The former would be used for long stop-overs, and would maintain the hangers and repair shop, while the latter would serve as a field for the fast mail planes and express passenger service.

This Committee proposes to leave the military establishment on Governor's Island. They would have the City extend the Island by using the thousands of tons of ashes now dumped at sea each day, and build the air field on this filled-in portion of it. The City owns the Barren Island site.

TRADE OF NEW ORLEANS.

Ocean-going vessels numbering 2,938, of 10,994,618 gross tonnage, arrived in the Port of New Orleans during the calendar year 1927, according to the records of the Board of Commissioners of the Port of New Orleans. Of these arrivals, 1,360 entered with general cargo to be discharged at New Orleans, 645 arrived with fruit and general cargo, 148 with fruit only, 138 with petroleum only, 420 in ballast, and 227 with freight in transit.

Of 2,934 (2,908) vessels leaving the port, 2,088 carried general cargo, 45 carried petroleum only, 735 left in ballast and 90 left with transit freight.

In the river trade there were 2,652 vessels, 1,081,435 net register tons entering the port. (Records for this class of trade are kept in net tons, for deep-sea vessels in gross tons). Of these river craft, 1,047, of 743,355 net register tons, were in the Mississippi-Warrior Services of the Inland Waterways Corporation, other vessels numbering 1,605, of 288,080 net register tons.

Expansion of the mahogany importing and manufacturing industry of New Orleans was indicated on January 12th by the Dock Board granting to the Mengel Company permission to use 2,400 ft. additional river frontage for log storage. This is in addition to 1,200 ft. of frontage already occupied by that Company.

At the same meeting a contract was awarded J. J. Clark and Company for re-covering the Toulouse Street Wharf Shed at a cost of \$8,068.00.

BLYTH HARBOUR DUES.

Reduced dues came into force at Blyth Harbour, Northumberland, on February 1st. The rate per register ton, inwards or outwards, if without cargo or taking bunkers only, is now 1½d. Ships entering or leaving with cargo from or to any place in the British Isles, the Isle of Man, or the Islands of Jersey and Guernsey, or any place between the River Elbe and Brest, pay 5½d. instead of 6d. The corresponding rate from or to any place in Europe between the River Elbe and the North Cape or in the Baltic Sea, and Baltic Canal or the White Sea, Iceland or between Ushant and the Straits of Gibraltar, is 7½d. against 8d. The rate from or to any other place whatsoever is 11½d. instead of 1s.

Vessels entering or leaving the harbour for docking or repairs without loading or discharging any cargo or bunkers will now pay at the rate of ¾d. per register ton against 1½d. previously. No change has been made so far as small coal and coke are concerned but the large coal dues have been reduced from 3½d. to 2½d. Small coal pays 1½d. and coke 5d. Since 1920 the Commissioners have found it possible to make concessions and this is the fifth reduction since that date.

WELLINGTON HARBOUR BOARD.

Wellington Harbour Board has decided to purchase a floating dock of a net lifting power of 15,000 tons, and of dimensions sufficient to handle the largest ships trading with New Zealand.

The Severn Barrage Scheme.

Some Observations on the Present Position.

By J. WULSTAN TWINBERROW, M.Inst.C.E.

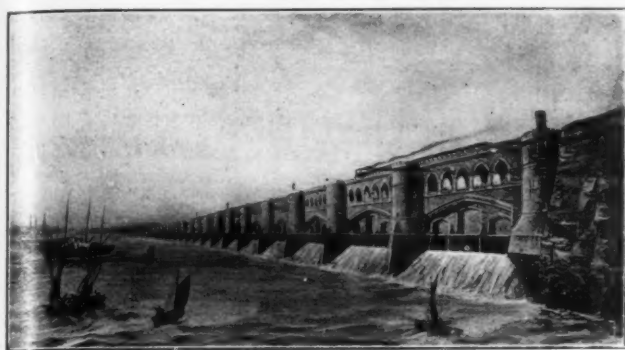


Fig. 1. Severn Barrage, as proposed by Fuljames in 1849.

Those who, in 1918, ventured to hope much from the Severn Barrage have every excuse for heart sickness by reason of the unaccountable way in which the promised re-investigation of the subject officially has from time to time been deferred. The delay in arriving at some definite conclusion as to the feasibility or otherwise of the project seems to the uninitiated quite incomprehensible especially as a most liberal provision was made by Parliament years ago to cover the cost of preliminary investigations. The feeling of impatience which has recently found expression in the non-technical press is fully shared by the engineering profession at large and especially by those who, as prime movers of the scheme, have the deepest interest in its fullest examination. It is not as though the thing had been tried out and found wanting. That would be definite though unsatisfactory. It is simply hung up. In a state of suspended animation. "Lost outright" may be more tolerable than "reported missing." Doubts and suspicions are engendered. Who is blocking the way? Has it become a party question? Or the prey of some circumlocution department? Or are there simply no votes in it? People wonder and are driven against their will to random guesses.

PRELIMINARY EXPENDITURE.

Consider yet again the history of this most intriguing proposal. After many nebulous suggestions extending over the last 50 years or more, it may be said to have been launched in workable form by private engineers who placed a summary of their investigations before the Water Power Resources Committee in 1918. This Committee was so constituted that its decisions carried great weight and in 1919 it reported its favourable impression on the case as submitted. In 1920 the Ministry of Transport became pronounced advocates of the scheme and in 1924 Mr. Philip Snowden authorised an expenditure of up to £95,000 to settle definitely as to its practicability. Later on, two of the most eminent members of the Institution of Civil Engineers, are said to have reported favourably to the Government on the practicability from a constructional point of view and an Admiralty survey of the estuary was put in hand. And now what advance has been made? Where do matters stand? Neither time nor money has been lacking. Over nine years. Over £90,000. Favourable opinions from the engineering and electrical experts to start from. And the result up to date—the survey party has lost a pinnacle or two. Colonel Brabazon has put forward an official estimate of £8,000,000 and Colonel Ashley



Fig. 2. A View in Gloucester Docks.



Fig. 3. The Severn Bore.

has been converted and has arrived at the belief "that within a convenient number of years it would be possible to say that such a scheme was within the range of practical politics." The experts of the Water Power Resources Committee appear to have got farther in 1919. Can this be considered satisfactory in view of the following facts. We have over 1,000,000 unemployed. We are backward in the supply of cheap electrical power. The tides running to waste represent a loss of upwards of 1,000,000,000 kilowatt-hours per annum. The steel and iron industries are depressed. The need of a direct crossing of the estuary for the main road traffic to and from South Wales has become more and more urgent. And presumably the Great Western Railway Company still wishes for a bridge as an alternative to the Severn Tunnel. Surely these are matters which ought not to be deferred "for a convenient number of years."

As a reason for the delay the enormous and novel nature of the proposal has been advanced. It has been stated that dam location, turbine and pump details, drainage, floods, bores, fisheries, navigation, costs and a host of other questions require re-investigation. Ultimately this will be the case, but for the present they can mostly be put on one side as superfluous. To advance them as a sufficient reason for holding up matters will not bear examination. It is not as though a start has to be made from practically nothing or from a chance suggestion. By 1918 all the points above mentioned had been carefully investigated and their relationship to the barrage considered to such an advanced point that an ultimate solution was assured. Tidal records had been kept on the spot which, with the help of Captain Beechey's really excellent survey of the estuary, allowed the power obtainable from every tide for a year to be accurately calculated. General drawings had been prepared, quantities taken out and estimates made within allowable "limits of deviation." The authorities, in fact, entered on a goodly heritage and progress might have been correspondingly expeditious. But no. All this appears to have been ignored and the cry has been "Back to Methuselah."



Fig. 4. The Severn Bore.



Fig. 5. The Gloucester and Berkeley Ship Canal at Frampton Bridge.

HYDRO-ELECTRIC PROGRESS.

Of course, since 1918 there has been considerable progress in hydro-electric engineering. Many matters have been simplified and the original plans will have eventually to be re-drawn to take advantage of the latest developments. But that can come in its proper sequence. And in the meantime developments go on daily. Since 1918 power storage schemes have been completed in Switzerland at Waeggital, Fully, Illsee and elsewhere, in which water is pumped to a higher level by off-peak power in the same way as was proposed for the Severn.

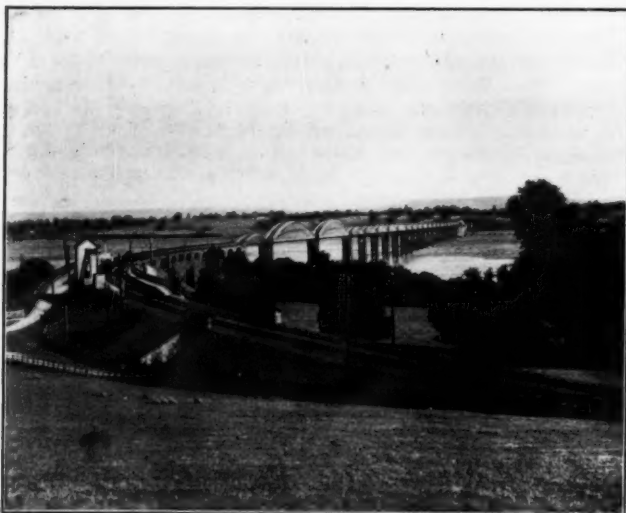


Fig. 6. The Severn Bridge at Sharpness.

The development of the propeller type turbine has, without involving any new departure, simplified the arrangement of a direct transverse barrage. The governing of turbines for constant speed under varying heads, though in sight in 1918, has now become a matter of greater certainty. The Ohio Falls Power Development deals with heads varying from 2.5 ft. to 37 ft. The Melones Power Station shows 94 per cent. efficiency at heads ranging from 160 to 220 ft. and so on. High lift centrifugal pumps are now running with an efficiency



Fig. 7. General View of Sharpness Dock.



Fig. 8. Ships of a past age in Sharpness Dock.

of about 85 per cent. In fact, help is coming from all quarters. From prophecy we have advanced to fulfilment. But it is a waste of time to discuss these things too meticulously and the reason is that nothing matters until the silt problem is satisfactorily solved. Silt is the fly in the ointment, the moth in the eye, the bug in the beam, which may bring down the framework which has been so carefully built up. So much work was done on the structure ten years ago that the framing might well have been taken for granted. The problem then became to kill the beetle. If that could not be done the structure might forthwith have been scrapped.

THE SILT PROBLEM.

The silt difficulty presents itself in several forms. Below the barrage where the interests of navigation are at stake. Above the barrage where the storage capacity may also be affected. In the high level reservoirs where it may be a minor nuisance. And in the wear and tear of the turbine runners. All these difficulties originally received attention and ways and means of further investigation were suggested. It was the cost of these that brought matters to a stand so far as private investigation was concerned. The Severn Estuary is a muddy one. The water is very highly charged with silt and this silt is easily influenced by any change of régime. The barrage will constitute a revolutionary change. To some extent organised control will replace chaos. But the enterprise is too large and Nature too complex for any guesswork. All possibilities must be foreseen and even then progress must be gradual.

Some experiments were made which should be enormously extended to determine the amount of silt contained in the



Fig. 9. The "Assyria" in Sharpness Dock. Modern Ships up to 420-ft. long, 56-ft. beam, with 8,000 or 9,000 tons of cargo, are handled in this Dock.

water everywhere and under all conditions, the transporting power of the tides at various velocities and the rate of deposition as the velocities fall. If ones convictions may be allowed to outweigh ones diffidence in making suggestions these experiments would be the first step. Coupled with the appropriate theoretical considerations valuable results would be reached. If utterly unfavourable the project could be dropped and all further expense and labour saved. But if the scheme survived the tests the next step would be a large scale model of the estuary from which the effect of a barrage operating under various working cycles might be ascertained. Again an unfavourable result would terminate the business but a successful one would be most significant. For one tenth of the authorised expenditure and one tenth of the time already wasted firm ground would be reached.

THE ALTERNATIVES.

A final choice would now be possible as to the three definite proposals which were considered:—(1) A direct transverse barrage and bridge at Beachley. (2) A transverse barrage at Severn Tunnel. (3) A longitudinal barrage with wings at Beachley. No. 1 has the great advantage that progress might go on gradually and tentatively by the construction of a barrage across the mouth of the Wye which seems to have been specially created by Providence for this purpose. Tidal power generation might then be tried out on a large scale at a moderate cost and with little risk. Nothing short of such a trial will be absolutely conclusive. If unsuccessful there would still remain a positive gain as the Wye would have been dockised at small cost, the bridge crossing facilitated, the Chepstow ship building yards resuscitated and a port provided for the shipment of Forest of Dean coal. If, on the other hand, unqualified success were obtained the lock through the Beachley Isthmus would follow and then the high level bridge and main barrage across the Severn Estuary either successively or simultaneously. Sadly it must be confessed that these things looked more like a prospect of the immediate future in 1918 than they do in 1928. Why should this be? To insinuate that the delay is due to lack of time (11 years over all!) for engineering investigations is an unwarrantable reflection on those who have dealt and those who are dealing with the proposition. The true reason must obviously be sought in some other direction.

Shipping at Constantinople in 1927.

Figures compared with 1926 and 1908.

The General Table below shows the number and tonnage of vessels, classified according to their nationality, which carried out operations in, or passed through, the Port of Constantinople in 1927.

GENERAL TABLE FOR 1927.

Nationality	No. of Vessels	Tonnage	Cleared	In Transit
Italian	1,168	2,624,822	397	771
British	955	2,080,180	268	687
Greek	1,249	1,592,815	49	1,200
Turkish	1,306	1,068,544	1,187	119
French	297	760,602	152	145
German	301	540,817	107	194
Rumanian	315	432,331	165	150
Norwegian	127	331,422	8	119
Dutch	189	322,518	63	126
Russian	161	292,220	66	95
Spanish	98	171,080	23	75
American	77	166,815	34	43
Egyptian	84	136,093	19	65
Yugoslav	51	91,455	17	34
Danish	54	83,992	9	45
Bulgarian	85	77,026	83	2
Belgian	33	77,007	3	30
Swedish	41	73,118	26	15
Persian	28	11,867	1	27
Portuguese	22	9,818	2	20
Peruvian	5	7,738	—	5
Hungarian	3	6,521	—	3
Finish	2	3,076	—	2
Polish	7	2,758	—	7
Total	6,658	10,966,435	2,679	3,979

It will be seen that the total number of vessels was 6,658 (10,966,435 tons), of which 2,679 vessels carried out commercial operations in the port and 3,979 vessels passed through in transit.

From the point of view of tonnage Italy heads the list with 2,624,822 tons, or 24 per cent. of the total, followed by the United Kingdom with 2,080,180 tons or 19 per cent. of the total.

COMPARATIVE TABLE.

Nationality	1927	1926	1908
British	268	227	318
Italian	397	450	260
Austrian	—	—	290
Greek	49	49	1084
French	152	202	276
Rumanian	165	200	158
German	107	102	266
Norwegian	8	6	—
Dutch	63	87	24
Russian	66	62	368
Egyptian	19	4	—
Yugoslav	17	35	—
American	34	27	1
Belgian	3	5	54
Bulgarian	83	78	148
Swedish	26	16	4
Danish	9	6	8
Persian	1	4	—
Polish	—	1	—
Spanish	23	11	—
Portuguese	2	—	—
Total vessels	1492	1572	3259

From this table it will be seen that the number of vessels carrying out commercial operations in the port has declined from 3,259 in 1908 to 1,572 in 1926 and 1,492 in 1927.

It should be observed, however, that a large share of this decrease is due to the fact that the number of Greek vessels has fallen from 1,084 in 1908 to 49 in 1927, as the local carrying trade is now in Turkish hands.

As regards United Kingdom shipping, the returns for 1927 show a decline of 50 vessels as compared to 1908, but an increase of 41 vessels as compared to 1926.

Port of Hamburg.

Negotiations for Czechoslovakian Zone.

The negotiations with regard to the assignment to Czechoslovakia of harbour accommodation in the ports of Hamburg and Stettin in accordance with the Peace Treaty are said to be nearing completion and a Czechoslovak delegation has arrived at Hamburg with a view to settling details. It is proposed to concede areas in either the Spree hafen or the Saale hafen at Hamburg where sheds, work shops, a coal shed and ship repairing plant will be erected.

According to a report received by the Department of Overseas Trade from His Majesty's Consul-General at Hamburg traffic through the Kiel Canal fell off somewhat during December, 1927, as is usual at this time of year. Compared with December, 1926, there was a decrease of about 250 vessels aggregating 100,000 net reg. tons passing through the canal and compared with the month of November, 1927, the traffic has also fallen off, the actual figures being as follows:

	No. of vessels.	Net reg. tons.
December 1927	3,657	1,600,901
November 1927	4,425	1,761,831
December 1926	3,900	1,709,561

The decrease is attributed to the severe winter which has interfered with shipping considerably more than last winter.

Of the 3,657 vessels in December, 2,278 were registered as sea-going steamers and aggregated 1,427,941 net reg. tons and 36 vessels aggregating 41,012 net reg. tons were sea-going motor ships. These two classes include 2,040 freight and passenger steamers aggregating 1,449,202 net reg. tons, 45 fishing steamers aggregating 3,047 net reg. tons and 195 steam tugs aggregating 6,887 net reg. tons. In addition there were 1,081 sailing vessels of 59,951 net reg. tons and 262 lighters and barges of 71,907 net reg. tons.

The vessels were loaded as follows:—Six with passengers, 186 with coal, 35 with stone, 33 with iron, 368 with timber, 505 with grain, 26 with cattle, 451 with ore and other bulk goods, 1,041 with piece goods, 58 with general cargos, 948 empty or in ballast.

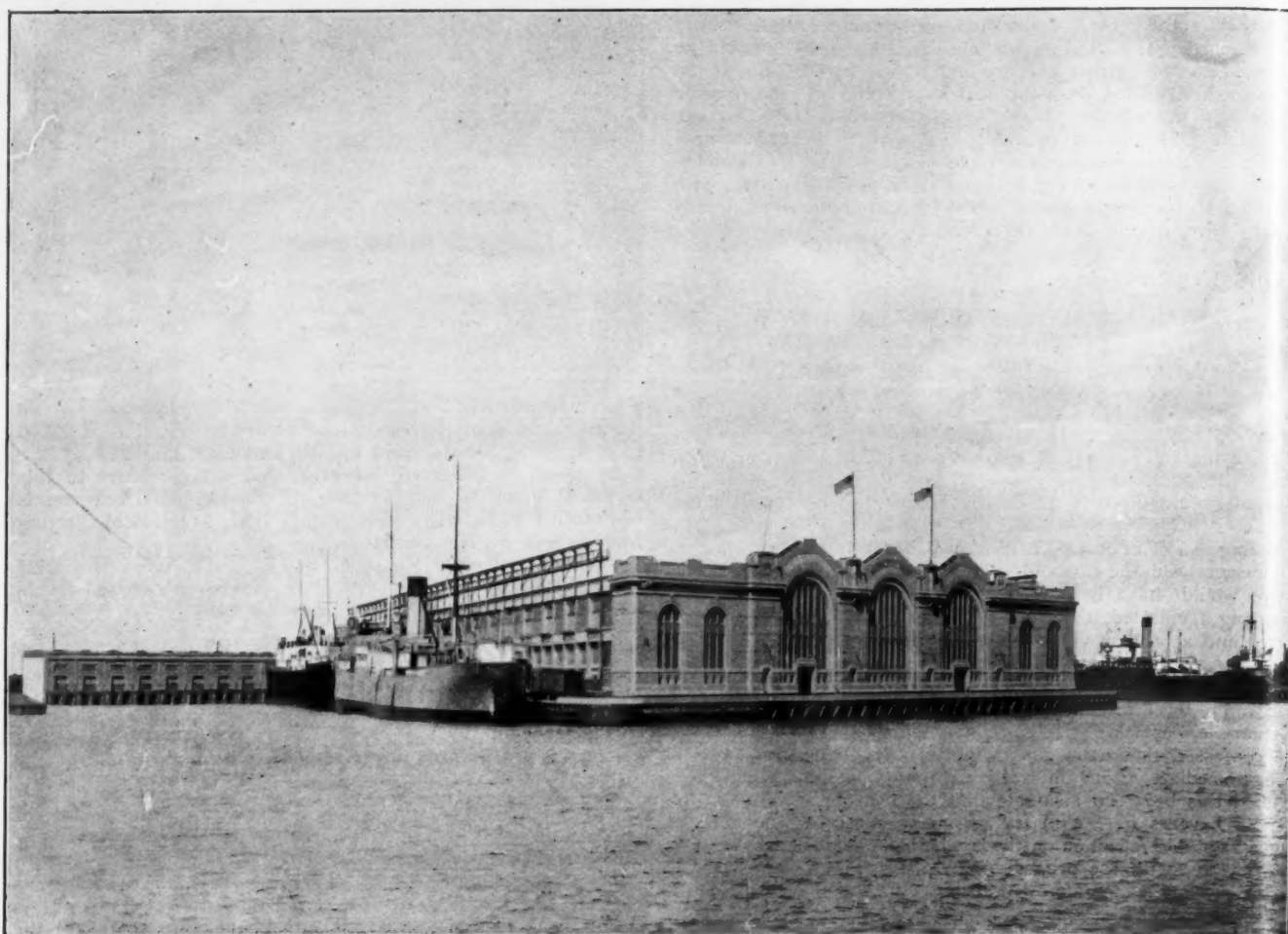
During December the number of vessels with cargo have decreased in proportion to the decreased traffic. The number of fishing steamers using the canal has increased considerably whilst sailing vessels being impeded by the ice conditions, have fallen off markedly.

Personal enquiries regarding shipping and transport matters should be made at the City Office of the Department, (Shipping and Transport Section), 78, Basinghall Street, London, E.C.2.

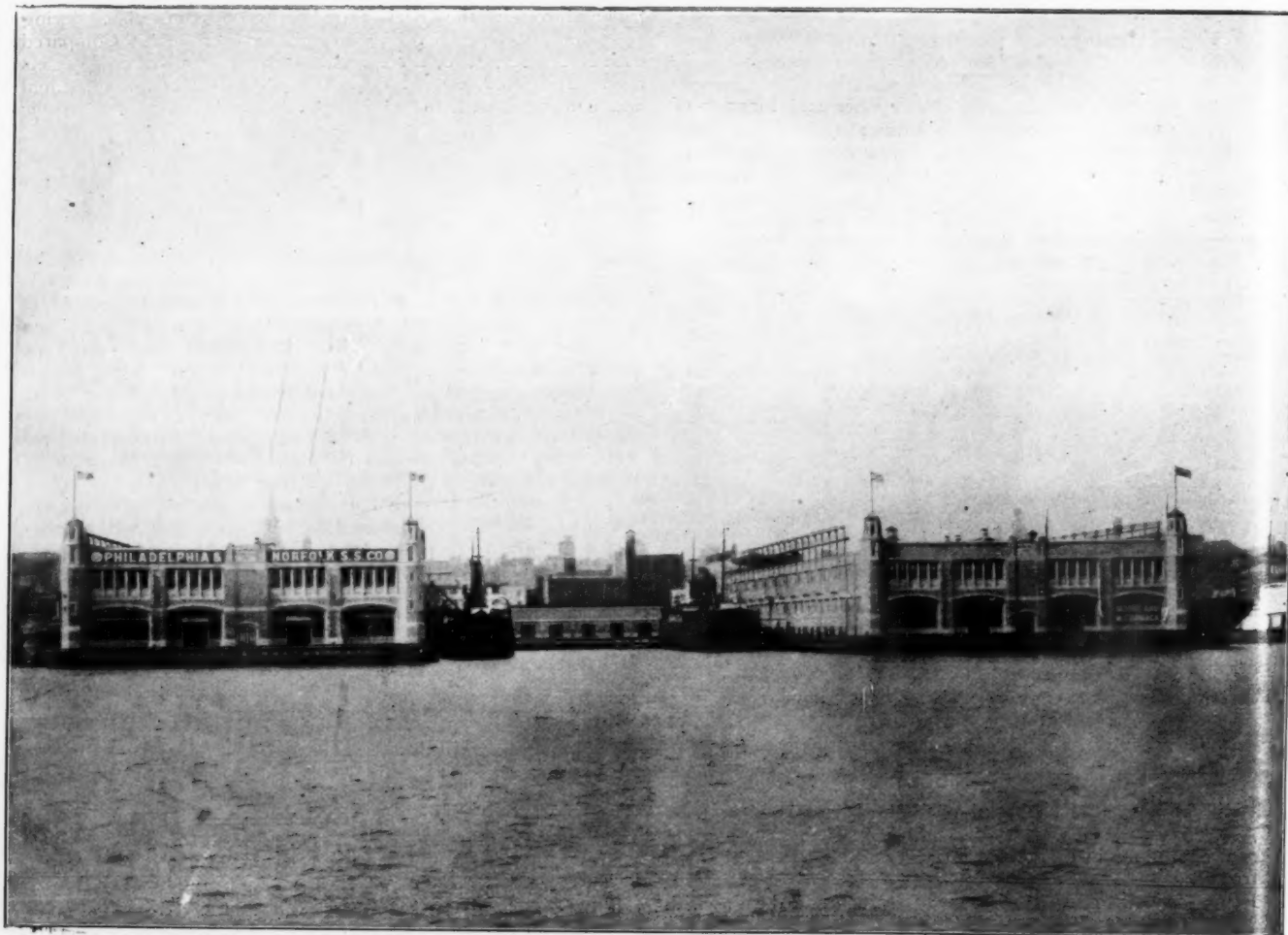
SHIPPING TRAFFIC AT FLENSBURG.

During the year 1927, 2,140 vessels aggregating 503,250 net reg. tons entered the port of Flensburg and 2,142 vessels, aggregating 521,100 net reg. tons cleared. These figures do not include the regular sailings between Flensburg and Lang Calligan.

The Port of Philadelphia.



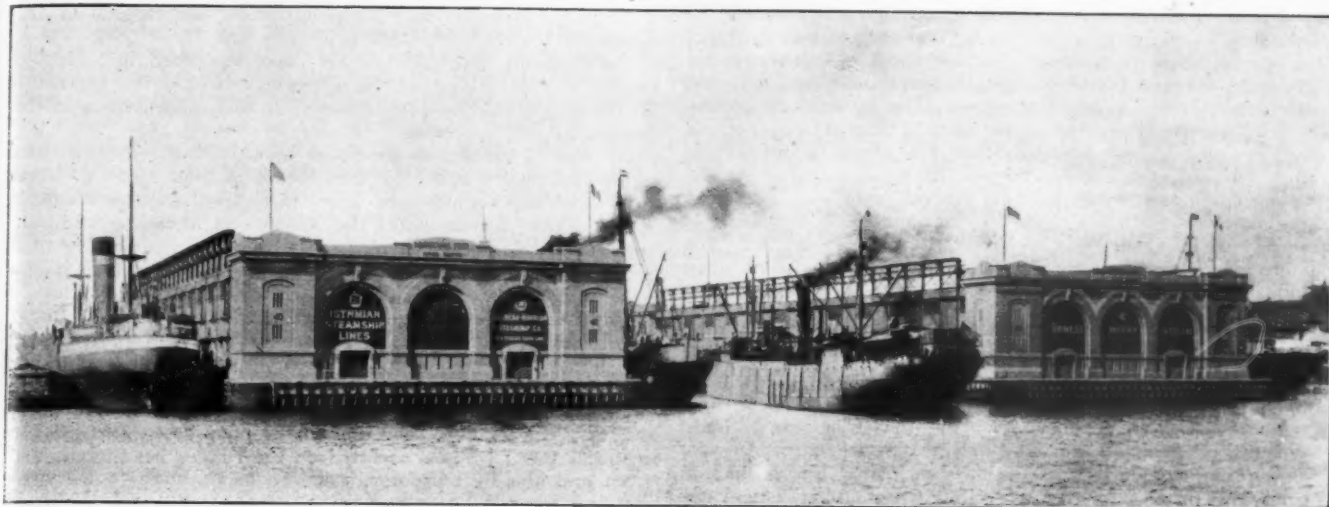
Pier 84 South, Porter Street, with Shipping berthed alongside.



View of Municipal Piers 3 and 5 North, Philadelphia.

The Port of Philadelphia.

Further New Piers under Construction at the Pennsylvanian Port.



Municipal Piers Nos. 38 and 40 South, Port of Philadelphia.

PHILADELPHIA'S great advantages as a seaport have been most convincingly demonstrated by the growth of trade in recent years, and according to the port authorities, this satisfactory condition finds its basis largely in the consistent efforts of the municipality to provide plenty of modern shipping facilities. The improvement of the City's water front, including the construction of immense piers, the building of storage houses, providing splendid street approaches to the same, and the deepening of the Delaware River Channel has made possible the rapid and economical handling annually of thousands of vessels engaged in foreign and domestic trade with a tonnage running into millions.

Philadelphia's facilities for handling marine commerce consist briefly of some 270 wharves of various sizes for the accommodation of every character of vessel. There are approximately 163 projecting piers. The water front terminals of three great trunkline railroads connect with tracks which extends over the entire American Continent. Emphasis is laid on the fact that business can be transacted through the Port of Philadelphia for \$1.67 per ton, as against \$2.80 through the Port of New York.

CENTRE OF TRADE.

The most concentrated activities of the Port of Philadelphia are centred along about six miles of water front on the Delaware River, extending from Greenwich Point about three miles south of Market Street and thence north to Allegheny Avenue, in what was formerly known as the old district of Port Richmond. Portions of the Schuylkill River also handle considerable traffic, owing to the large exports and imports of oil, and a large percentage of the gross export tonnage of the port originates on this stream. The principal marine terminals of the port are those owned by the City and comprising 15 well-constructed piers, in addition to a score of small industrial wharves belonging to the same body.

The main Delaware River water front is served by the Philadelphia Belt Line Railroad, a quasi-public corporation, by means of which occupiers of any of the public or private wharves in this section of the City can obtain direct car service. The importance of this privilege to ship owners and operators and to large shippers can scarcely be over-estimated. Virtually all the steamship wharves are provided with railroad tracks running on them for nearly their whole length, usually in sunken pits, which bring the car floors level with the pier deck, and greatly facilitate the easy and economical transfer of freight between vessels and cars and cars and vessels. In addition to this, nearly all of the large municipal piers are equipped with apron tracks.

CONSTITUTION.

The Port of Philadelphia from 1766 until June 8th, 1907, was under the jurisdiction of the Board of Wardens for the Port of Philadelphia. The first decided step to improve and modernise the port was made in the early nineties, when a number of progressive shipping men, including the late B. F. Clyde, F. S. Groves, William D. Winsor, Joel Cook and William R. Tucker (the latter still living) pushed to a successful conclusion the acquisition by the Government and the removal of Smith and Windmill Islands, which were located in the middle of the Delaware River within the limits of what was once known as the old City proper between Vine and South Streets. These islands so obstructed the harbour

as to render it impossible to run piers into the river to a sufficient extent to accommodate ships of increased size and tonnage which were rapidly taking the place of the old sailing craft. The work of the removal of these islands occupied a number of years, and when completed it enabled the extension of the pierhead line and made possible the lengthening of the piers in front of the City. It also made possible the widening to the eastward of the marginal street known as Delaware Avenue from 50 to 150 and 250 ft., and to-day this is one of the best-paved marginal streets along the harbour of any city.

A DEVELOPMENT PROBLEM.

Following the removal of Smith and Windmill Island, the extension by the Government of the pierhead line and the widening of Delaware Avenue none of the private owners or corporate interests developed the port to the extent that was anticipated. There was no branch of the Municipal Government through which water front improvements could be made. The Board of Wardens, which was a State and Municipal Body, did not possess initiative powers, and the port was fast losing its prestige. In the early part of 1907, Mr. J. S. W. Holton, then President of the Philadelphia Maritime Exchange and still holding that office, with vision for the future reached the conclusion that a port could only be developed by the State or Municipality. He rather shocked the more conservative of the shipping men by having drafted, for presentation to the State Legislature then in session, a Bill abolishing the Board of Wardens for the Port of Philadelphia and establish in its place the Department of Wharves, Docks and Ferries and the Board of Commissioners of Navigation—a State body. The Bill met with instant opposition on the part of the old conservatives and many of the corporations doing business with the port, but, despite this, Mr. Holton, at his own expense, fought it through the Legislature and it was promptly approved by the then Government—Edwin S. Stuart.

The City of Philadelphia has invested approximately \$40,000,000 in port improvements during the last fifteen years and the wisdom of following a consistent line of development is apparent in the increase of tonnage handled annually. In 1906 the gross tonnage of vessels arriving and departing in the coastwise and foreign trades was 18,000,000 tons and in 1926



View of Municipal Pier, No. 78 South, Port of Philadelphia.

this tonnage had increased to 41,872,000. In 1906, the Custom receipts amounted to \$20,500,000 and in 1926 to \$50,700,000.

MOYAMENSING IMPROVEMENT.

The City's part in port improvement has been supervised by the Department of Wharves, Docks and Ferries and some splendid Marine Terminals have been constructed. In the Moyamensing Group, the department has found opportunity to build piers of the largest dimensions and of a distinctive type. This development plan was promoted under the terms of an agreement between the City and the several railroads, carrying with it the elimination of grade crossings in the southern section of the City, the construction of under-grade and over-grade street crossings, a considerable mileage of elevated and surface railroad tracks, the construction of large classification yards, the opening and extension of several miles of improved marginal avenue skirting the river front and the acquirement of property upon which the City piers have been built. The co-operative efforts of the railroad companies have also included building several large plants for the handling of perishable products.

These satisfying conditions have paved the way for the City to continue its policy of port development. The Philadelphia Army Base, great triple-deck piers now actively used as a shipping terminal, heretofore marked the southern limit of Philadelphia's Port expansion. Now the City must build beyond this point. The marginal way—Delaware Avenue, must be improved. Beyond the one-time Army Base, which is at present the headquarters for the Philadelphia Tide-water Terminal Company, approximately 2,500 linear feet of bulkhead frontage and a large tract of backlands will be available for the development of the lower group of the Moyamensing Piers. This site has been planned for wide piers—1,200 ft. long with ample waterways between—and all other necessary adjuncts to complete a modern terminal that can be worked as a concentrated unit. There is an abundance of space for car service and storage yards, approach streets, and necessary warehouse facilities.

NEW PIERS.

The adopted plan of the Moyamensing Pier group includes four terminals, known as Municipal Piers Nos. 78, 80, 82 and 84, South. Pier 78 has been in use for several years and the sub-structure of Pier 82 was completed, at a cost of \$1,412,924 in 1921. Early in 1926 Pier 84, the most southerly of this group and the largest municipal harbour structure, was completed at a cost of \$3,662,424. It is now under lease for a five-year period to the Luckenbach Steamship Line for a total rental covering the five years of \$575,000. The tremendous size of this pier—336 ft. wide by 900 ft. long—provides capacity for 190,000 tons of cargo on both docks and berthing for four 10,000-ton ships at one time. Railroad tracks have been built on both sides of the shed and with the three depressed tracks inside of the shed there is capacity for 84 cars. All modern appliances for the expeditious transfer of cargo between ship and terminal have been installed.

The building of Pier 80 has been under way since May, 1926. The first contract for this structure covered the building of a large part of the structure and was completed July 2nd, 1927. A total amount of \$1,082,635 was paid on this account to the McLean Contracting Company, and a second contract with the same company covers the outshore end of this pier's sub-structure; calls for a limit of expenditure of \$440,000 and is 90 per cent. completed. With the beginning of the new year the department will ask for prices for building the super-structure, this to be similar to the pier at Porter Street, or No. 84.

In connection with the development of this Moyamensing Group project, the department has also built a municipal car storage yard, at a cost of \$173,710, adjacent to the piers, and it is essential to the expeditious and economic operation of the Group. The yard provides for the storage of 312 cars on approximately five miles of tracks. With this car service yard located immediately in front of the piers, it is possible to shift cars to ship-side without waiting for the transfer of cars from some distant railroad yard.

Tyneside Shipbuilding.

Launch of the S.S. "Scottish Chief."

The steel screw steamer *Scottish Chief* the first of two similar vessels building by Sir W. G. Armstrong Whitworth and Co., Ltd., for Tankers Ltd., London, was successfully launched from the Armstrong Yard at Walker-on-Tyne, on Tuesday, February 7th.

The launching ceremony was gracefully performed by Miss Ada E. White.

The principal dimensions, etc., of the *Scottish Chief* are as follows:—Length between perpendiculars, 440 ft.; Breadth moulded, 56 ft. 8 in.; Depth moulded to upper deck, 33 ft. 11 in.

The vessel is designed to carry a total deadweight of 10,000 tons on a summer draft of 26 ft. 8 in., and the speed on trial when loaded to this draft is 11½ knots.

She is of the two deck type, with poop bridge and forecandle, and is built on the longitudinal system of Lloyds highest class.

The vessel is fitted with a raked stem and elliptical stern, and the oil cargo is carried in nine double compartments having a cargo pump amidships, extending from side to side of the vessel.

The captain and officers are accommodated in amidship houses on the bridge and upper bridge decks, the engineers on the poop, and the petty officers, seamen and firemen in the forecandle.

Oil fuel is carried in the cross bunker at the forward end of the machinery space, and in the deep tank forward. The feed water tank is arranged under the engine and water ballast in the double bottom under the boilers and in the fore and aft peaks. Two direct coupled generating plants are installed each having a vertical single cylinder engine, and a multipolar type dynamo.

The vessel is electrically lighted throughout, and is fitted with wireless installation.

A horizontal direct acting steam windlass, capable of working the bower cable and bower anchors, is fitted on the forecandle deck. Three steam winches are fitted, one on the fore deck, one on the after deck, and one on the poop deck aft. Electric hydraulic steering gear is fitted on the rudder head, controlled from midships by telemotor.

The cargo oil pumps are two in number, and each is capable of discharging 300 tons of oil per hour. The oil piping is so arranged that the pumps can deal with the oil in every way conceivable. The ballast pump and an oil fuel transfer pump are fitted in a pump room in the fore hold for dealing with water ballast and oil fuel forward.

The propelling machinery consists of a set of direct acting surface condensing quadruple expansion marine type engines of the most modern and improved design, having cylinders 24½ in., 34½ in., 50 in., 74 in. with a stroke of 54 in. This propelling machinery has been constructed by Sir W. G. Armstrong Whitworth & Co., at their Marine Engine Dept.

The boilers, four in number, are of the Babcock and Wilcox watertube type, arranged for forced draught, to burn oil fuel on the White patent system.

Union des Chambres de Commerce Maritimes et des Ports Français.

The Importation of Oil.

The January meeting of the Union des Chambres de Commerce Maritimes et des Ports Français was presided over by Mons. Charles Chaumet, Senator and former Minister.

The General Secretary, Mons. Gustine, analysed the clauses of the last Loi de Finance which deal with harbour matters. He pointed out that the credit voted by Parliament for both new works and maintenance were much smaller than those asked for by the Government, as the Minister of Public Works himself acknowledged in his speech to the Senate. However, thanks to the fulfilment of the Dawes Reparations Plan, considerable improvements may be effected at the chief ports.

Article No. 170 of the "Loi de Finance" fixes at 800,000,000 francs the amount to be spent on improving ports, canals, roads and telephone lines under the Dawes Plan.

The representatives of the various ports have expressed the wish that the greater part of the German contribution in kind should be devoted to harbour works.

The "Union" examined carefully the consequences of Article 59 of the "Loi de Finance" and thought that the addition of a tax on passengers using French ports might prove fatal to some of them.

In respect of the proposed law affecting oil importation the Union expressed two desires:

1. The maintenance of the "Entrepot Réel Spéciale des Pétroles" where the oil stored is still regarded by the Customs as outside the country.

2. That the oil stored in "Entrepot Réel" should not be included in the country's stocks which the law will make compulsory.

It was felt that the moderate Custom duties of the Law of August 5th, 1919, on distillates (gas oil, fuel oil and road oil) should be retained in order not to jeopardize the use of Diesel motors in France.

PORT OF HARBURG TRAFFIC.

During the year 1927, 3,478 vessels aggregating 985,157 net reg. tons entered and 3,473 vessels aggregating 988,601 net reg. tons cleared, as against 958,959 net reg. tons entered and 958,100 net reg. tons cleared in 1926. The goods handled amounted to 1,159,137 tons inward and 394,238 tons outward, as against 761,624 tons and 1,044,044 tons respectively in 1926. The decrease in the outward cargoes is attributed to the cessation of coal exports to the United Kingdom.

The Growth in Dimensions of Ships and its Bearing on Ports.*

By J. F. RAMSBOTHAM, M.Inst.C.E., M.Am.Soc.C.E.

(Concluded from page 64.)

The unfortunate loss of the *Titanic* on the 15th of April, 1912, is now looked upon merely as an episode of the sea, and will not limit in any way the tendency to build even larger vessels. Further, when viewed with the more recent loss of the *Empress of Ireland* on the 29th May, 1914, it will be realized that the consequences may be just as disastrous to life on the smaller type of vessel. The following comparison of the two vessels is interesting:—

	Titanic.		Empress of Ireland.	
Gross tonnage	45,300		14,191	
Deck department	43 saved out of 66		36 saved out of 59	
Engine Room	72	325	95	134
Victualling	97	494	113	212
Victualling Women	20	23	1	10
Total of above	232	908	245	415
Passengers	499	1,316	217	1,047

From the above figures it is seen that 37 per cent. of the passengers were saved from the *Titanic* and 20 per cent. of the passengers saved from the *Empress of Ireland*, the advantage being in favour of the larger vessel.

It is realized that the causes of the accidents were not similar, but from the locality of the accidents it would appear that, if anything, the *Titanic* was, on account of being out at sea, at the worst disadvantage. Under some circumstances it would seem that almost any vessel is bound to sink, if for example, one side is stripped off; and the factors for safety now remain the same as they have always been, i.e., great care in navigation, and not taking gratuitous risks. The author ventures to say that vessels of a larger type and carrying capacity together with great speed will always claim a preference over the smaller type of vessel, and be received with satisfaction by the general public in Australia.

THEIR INFLUENCE (MAMMOTH VESSELS) ON AUSTRALIAN PORTS AS COMPARED WITH BRITISH PORTS.

The advent of mammoth liners has created increased anxieties for shipowners, navigators and Port Authorities, and whilst their employment has shown a saving as compared with vessels of less tonnage, it must be realized that any delay in discharging or loading the former type of vessel is disastrous to the owner. The author has been to many ports, and although it may seem out of place to state it, he is compelled to say that the Port of Liverpool is the most conveniently arranged, and the best mechanically equipped port that he has seen. The port has been zoned into trades with available depths of water, warehouses and sheds, suitable for vessels engaged in that trade. Suitable graving docks have been established, contiguous to those areas, and the port has never lagged behind its competitors. The latter point is emphasized by the recent completion of the Gladstone Dock system, costing £7,750,000 and capable of handling any tonnage afloat.

The major ports in Great Britain are alive to their responsibilities, as is witnessed by the expenditure of vast sums of money at Southampton and the Port of London.

The following tables give particulars of the largest vessels at present in commission.

Ship.	Gross Tons.	Net Tons.	Length.	Breadth.	Depth.
Mauretania	31,938	12,797	762.2	88.0	57.1
Aquitania	45,647	21,992	868.7	97.0	49.7
Olympic	46,359	22,350	852.5	92.5	59.5
Berengaria	52,117	23,882	882.9	98.3	57.1
Leviathan	54,282	25,548	907.6	100.3	58.2
Majestic	56,551	—	915.5	100.1	59.2

Ship.	Loaded Draught.	Type of Engines.	Built.
Mauretania	36 0	Turbines	1907
Aquitania	35 3 1/4	Turbines	1914
Olympic	34 7	Turbine and Recip.	1911
Berengaria	35 6	Turbines	1912
Leviathan	—	Turbines	1914
Majestic	—	Turbines	1921

All these vessels are engaged in the Atlantic trade; yet it is the author's opinion that history will repeat itself in due course, and as Australia develops and increases her potential wealth so will the size of steamers serving her interests increase.

Confirmation of this is obtained in tracing the history of the P. and O. steamers engaged in the Australian trade:—

*Reprinted from the "Transactions" of the Liverpool Engineering Society by permission of the Council.

Vessel.	Date.	Gross Tonn.	Population of Australia.
Shanghai	1851	546	405,400
Baroda	1864	1,874	1,200,000
Indus	1871	3,462	1,700,000
Rome	1881	5,013	2,231,000
Australia	1892	6,898	3,300,000
Marmora	1903	10,500	3,900,000
Mooltan	1922	20,800	5,633,000

After studying these figures there is ground for the conclusion that Australia has been well served by private enterprise, and shipowners have responded to her development and been fully alive to their responsibilities.

Space forbids the author to show how Australia's wealth and population have coincided with this increased size of steamers; but he wishes to emphasize a very important point at this stage. Both the British and Australian Governments clearly see that one of the few ways out of the present financial morass that almost overwhelms Great Britain's trade is the pooling of the Empire's resources and markets.

In his recent tour the Rt. Hon. L.C.M.S. Amery, M.P., Principal Secretary of State for Dominion Affairs and for the Colonies, visited Australia in order to study the problem on the spot, and his conclusions will be regarded with interest in both Hemispheres.

To revert to the problem of the influence of the size of steamers on Australian Ports, the following available depths at main ports are interesting, viz.:—

Fremantle	36 ft. below low water level.
Albany	33
Adelaide	35
Melbourne	36-37
Sydney	40
Brisbane	28
Hobart	60

These depths have been obtained (Hobart and Sydney excepted) only after the expenditure of considerable sums of money, and greater depths can be obtained only by expending further considerable sums of money. Brisbane has regarded itself as a terminal port, and also as a port for the initial loading and departure of large vessels; consequently, in both cases, the vessels have arrived and departed light.

This has been upset by the opening of the Panama Canal, the usable length of the canal being 1,000 ft., the width 100 feet, and the least depth of water over the sills 41 ft.

After careful observations the author has come to the conclusion that generally speaking the natural conditions prevailing in Australia are most favourable for the economical building of harbours and ports, but that the wharves and facilities supplied for the quick and economical handling of cargo are bad, frequently being non-existent, and that unless some remedy is quickly applied, it will deter shipowners from expanding in a direction where their business instinct would seem to advise them to extend. Further, that if some of the conditions which prevail at the Ports of Liverpool, Manchester, Bristol and Glasgow, were applied to the Adelaide, Melbourne, Sydney and Brisbane Ports, the result would be a material reduction in those commodities which tend to cover what may be termed "the cost of living," and also Australia would benefit financially in putting her goods on to the world's market. In the years 1912 and 1913 the author reported to the West Australian Government on the future extensions of their four principal ports, and he emphasized the desirability of abandoning timber wharves and providing solid concrete walls, for this purpose using reinforced concrete tanks, built on shore, and then floated and sunk in position. The caissons were to be founded at 42 ft. 6 in. below low water level. He further emphasized the desirability of using branch docks, instead of having all berths parallel to the shores, as this procedure is extravagant in first cost, necessitating the use of an unduly large water area for handling vessels, &c.

Taking into consideration the probabilities of mammoth vessels coming to Australia the author recommended a width of 450 ft. for the branch docks, with a depth of 40 ft., and a length of quay of 1,800 lineal feet. It can readily be seen how impossible it would have been to have created the Port of Liverpool with 30 miles of quays if this policy of making quays parallel to the shore had been persisted in, and unquestionably the next century will witness extraordinary development in Australia.

If unduly wide branch docks are made, then a corresponding increase is met with in not only the capital cost of dredging, but also in maintaining dredging.

Space forbids the author to proceed any further in this direction, and in conclusion he would like to say that in his opinion very few people, at any rate in Great Britain, have any conception of the vast natural wealth of Australia. That wealth must, however, find its exit through the ports of Australia, and consequently their equipment is a matter that is vital to the community at large.

The Port of Montreal.

The History and Facilities of a Great Inland Harbour.

By LAURENCE CHALMERS TOMBS, M.A.

(Continued from page 44.)

RAILWAYS.

MONTREAL is the headquarters of the Canadian Pacific and the Canadian National Railways and is also served by the Delaware and Hudson, Montreal and Southern Counties, New York Central, Quebec Montreal and Southern, and Rutland railroads. All of these roads connect with the Harbour Commissioners' railway



River St. Lawrence and Elevator No. 3, Montreal.

through the C. N. R. and C. P. R. All manufacturers and shippers have, therefore, equal facilities for reaching the wharf. The great bulk of the general cargoes are transported to and from Montreal by the C. N. R. and C. P. R. In some seasons they also bring in about 50 per cent. of the grain and flour. The balance comes in by water (a). In some ports there is a tremendous tonnage handled by motor truck and barge. This is not the case at Montreal.

The first railway in Canada (b) was the diminutive Champlain and St. Lawrence, granted a charter in 1832 (c) and opened four years later between Laprairie, on the south bank of the St. Lawrence opposite Montreal, and St. Johns, 16 miles away. Connections were made with New York through the Richelieu, Lake Champlain and the Hudson River. Up to 1846, in which year the Montreal and Lachine was opened, the Champlain and St. Lawrence was the only steam railway in British North America. The Atlantic and St. Lawrence, which initiated the intimate connection between Montreal and Portland, Maine, for many years practically a "Canadian" port, was opened in 1852. These roads were absorbed by the Grand Trunk Railway, incorporated in 1852, eventually including 125 different companies, and now part of the Canadian National Railways.

The Grand Trunk Railway, built largely with English capital, and its affairs directed from London, although its operating headquarters were in Montreal, was completed between Montreal and Toronto in 1855. The Victoria Bridge, constructed by George Stephenson's son for the Grand Trunk, spanning the St. Lawrence at Montreal, was opened in 1860. Hitherto there had been no definite or continuous railway policy. The Grand Trunk had tapped the Great Lakes at Detroit and Port Huron and opened up the first grain route from the Great Lakes to Montreal. Determined to secure a share of the products from the Middle West for Montreal and Portland, the Grand Trunk reached Chicago in 1880. In 1905, it began the Grand Trunk Pacific to participate in the expansion of the Canadian West, and at the same time the Dominion Government undertook the construction of an "air" line from Moncton to Winnipeg for the announced purpose of hauling grain to Canadian ports and for the development of a second Canada in northern Quebec and Ontario.

The Intercolonial, (d) one of the chief obligations of Confederation, built by the recently (1867) constituted

Dominion Government, was opened from Halifax to Rivière-du-Loup, Que., on July 1, 1876, to connect the Maritime Provinces with Quebec and Ontario.

British Columbia entered Confederation in 1871 contingent upon the building of a "Pacific railway" within ten years. Sir Sandford Fleming made the original survey in the 'seventies. A period of uncertainty and delay was followed by four years of intense effort, the last spike being driven in at Craigellachie in the Rockies on November 7, 1885. George Stephen (later, Lord Mount Stephen) was the first President (e) and W. C. (later, Sir William) Van Horne, the first General Manager. The Canadian Pacific has been extraordinarily successful. It controls and operates from Montreal, in round figures, 19,000 miles of railway, 15 hotels, 115,000 miles of telegraphs and 100 ships in ocean, coastal and lake service, and employs 100,000 men and women. The Canadian Pacific Railway has provided for thirty years the most efficient, complete and attractive transportation service in the world. It has led the colonisation of the Canadian West. It has done more to promote the welfare and progress of Canada than any other single agency.

Some 30 years ago, the western farmer first demanded rail competition and lower freight rates. Acting on this incentive, two railway contractors, William (later, Sir William) MacKenzie and D. D. (later, Sir Donald) Mann acquired a few miles of track at Portage la Prairie, Man., in 1896 which they proceeded to extend. The Manitoba Government leased to them the Canadian lines of the Northern Pacific R.R., then in the hands of receivers, MacKenzie and Mann having agreed to reduce the freight rates on wheat to the head of the lakes. Other roads were purchased and by the construction of the necessary links and with much government assistance Montreal and Quebec were reached in one direction and Vancouver in the other. The Canadian Northern opened enormous districts in Quebec, Ontario and the West, and was beginning to resemble a second Canadian Pacific when its financial difficulties, brought to a head by the Great War, forced the Dominion Government to take over the road and its liabilities.

The Government system, the Canadian National Railways, was co-ordinated in the years 1917-19, by the amalgamation of the Canadian Northern-Grand Trunk, Pacific, the two Government lines: the Intercolonial and the National Transcontinental, and finally the Grand Trunk making a total mileage of 22,191 (f). The Canadian Railways also own and operate 75 ships, 13 hotels, and 112,000 miles of telegraph wires; their employees total 101,000. An excellent service is maintained with a consistent effort to develop the resources of both East and West. In 1925, the Canadian National moved 47.6 per cent. of the western grain crop.



New Eastern Section of Montreal Harbour, shewing Elevator No. 2.

All Canadian railways have been heavily subsidised by Government land and money grants. There is duplication, even triplication, of tracks and service. Colossal sums have

(e) Lord Mount Stephen resigned in 1888; his successors have been Sir William C. Van Horne (1888-98); Lord Shaughnessy (1898-1918); and E. W. Beatty, K.C., President since 1918, Chairman since 1923.

(f) The German Federal Railways, created in 1920, with 32,932 miles, are now the largest railway system in the world, the Canadian National being second.

(a) In 1925, 124,827,099 bushels of grain arrived in vessels, and 38,974,626 in cars.

(b) Total Canadian railway mileage: 1849, 54 miles; 1867, 2,529 miles; 1926, 40,061 miles (exclusive of double tracks and sidings). Canada has the largest per capital mileage in the world.

(c) The first regular railway in the world was the Stockton and Darlington, near Manchester, opened September 22nd, 1825, with George Stephenson's "Locomotion No. 1." The Baltimore and Ohio, 1830, was the earliest American road in operation.

(d) Now included in Canadian National Railways.

been spent to provide transportation facilities vastly ahead of the actual development of the Dominion.

TRADE.

Montreal retains its supremacy over all North American ports in the carrying of wheat, cheese, and in the growth of its business generally (g). In 1907, the year of the reorganisation of the Harbour Commission sea-going vessels entering the port totalled 740, with a net registered tonnage of 1,924,475, as compared with 1,255 vessels of 5,104,313 tons in 1925. The value of the merchandise exported was \$85,495,534, and of imports \$108,391,891, a total of \$193,887,425, in 1907; as compared with exports of Canadian origin, \$239,314,769, and \$187,463,477 imports, totalling \$426,778,246 in 1925 (h). Exports to the United Kingdom, Germany, France and Belgium showed substantial gains in 1925. Wheat remains the backbone of the export trade and is so important that it is described separately in the chapter following (i). There are many changes and fluctuations in the commodities handled. In 1907, for example, Montreal exported 113,996,314 feet B.M., of timber and deals principally to the United Kingdom. This trade has been decreasing and in 1925 the total shipments had dropped to 57,572,000. In 1908, there were the following shipments of livestock; 147,216 cattle and 61,017 sheep; in 1925, there were only 54,617 cattle. In 1909, lard shipments amounted to 409,238 packages against 1,399,161 in 1925. In 1908, the apple exports were 325,821 barrels and 22,152 cases, compared with 389,141 barrels in 1925. Hay shipments in 1907 were 136,789 bales; in 1910, 717,715 bales; compared with 139,118 bales in 1924 and 237,799 in 1925. In 1909, flour shipments were 1,713,325 sacks and 210,578 barrels as compared with 4,805,050 sacks in 1925. In 1907, the butter exports totalled 66,773 against 599,086 packages in 1925. In the former year, 1,973,417 boxes of cheese were exported, compared with 1,688,277 in 1925. The export of pulp, paper and automobiles was practically non-existent in 1907. In 1925, these commodities made up a very important part of the general cargo so necessary to a port. In 1907, the total grains shipped through Montreal were 32,783,018 bushels compared with the striking increase to 166,212,335 bushels in 1925 (j). Canada is normally not an exporter of cement. In 1925, however, no less than 22 vessels left Montreal for Miami and other United States ports.

FLOUR.

Montreal is the head of the flour milling industry of Canada. An outstanding feature of the 1925 export business, totalling 315,433 tons, was the continued demand from Europe, the satisfactory trade with the British West Indies, and the extraordinary large purchase by Soviet Russia of 1,900,000 barrels, practically all of which moved through New York in January and February.

Exports of flour from the Port of Montreal to different countries, in the years 1921 to 1925, inclusive (k):—

	1925 Flour Sacks	1924 Flour Sacks	1923 Flour Sacks	1922 Flour Sacks	1921 Flour Sacks
Hamburg	876,339	577,184	1,072,533	543,225	111,155
Glasgow	659,514	716,586	740,869	906,168	694,341
British West Indies ...	566,145	562,764	426,020	—	126,080
London	479,554	548,485	706,777	922,329	725,422
St. John's, Newf'dland ...	388,758	507,862	410,916	150,018	313,005
Copenhagen	338,522	338,077	170,966	12,090	11,685
Leith	248,473	298,058	314,519	420,554	273,736
Rotterdam	184,646	132,896	72,242	94,679	70,334
Belfast	157,531	170,687	205,169	409,113	167,913
Dublin	132,213	190,770	87,781	198,530	219,758
Bristol	129,493	149,965	125,105	200,865	139,646
Norway	93,220	22,000	219,218	43,653	13,050
South Africa	84,061	91,908	72,716	87,368	24,517
Dundee	80,778	49,111	20,657	—	—
Antwerp	71,578	5,189	11,260	10,071	47,622
Liverpool	64,427	104,463	76,580	237,820	124,018
Manchester	30,048	27,648	30,803	36,551	62,948
Southampton	32,045	23,800	46,732	40,728	11,950
Sundry ports	83,781	266,154	159,000	234,431	190,335
Totals	4,701,126	4,783,957	4,969,863	4,548,193	3,327,516

PACKING HOUSE PRODUCTS.

It has been pointed out that the Grand Trunk (C.N.R.) extended its rails into Chicago to secure a share of the Western trade, notably the enormous movement of export meats. In this they have been quite successful and both they and the Canadian Pacific run special solid refrigerator trains of 3,100 tons from Chicago to Montreal in 50 hours,

(g) Vancouver, now the most important port on the Pacific, shows the greatest percentage of increase.
(h) The above figures do not include 5,957 inland vessels with a net registered tonnage of 9,678,163. The figures showing the value of merchandise exported do not include the value of foreign goods in transit through Canada, of which there is a large tonnage of grains, packing house products and automobiles, which show a steady increase. These figures are interesting in showing the growth of purely Canadian exports through the port of Montreal.
(i) Grain represented 76 per cent. of the total tonnage exported in 1925.
(j) Figures from Montreal "Gazette," Montreal Board of Trade and Montreal Harbour Commission, Annual Reports, 1925.
(k) From the "Gazette," report of 1925.

and for Canadian meats from Toronto in 18 hours. The total exports for 1925 from Montreal were: meats (cured) 102,084 tons; fresh or frozen 6,839; meats in tins 2,259; lard 43,947. Of these, from 75 to 80 per cent. were of American and the remainder of Canadian origin. (l).

BUTTER.

The export trade in creamery butter from the port of Montreal in 1925, was the most satisfactory for a number of years. There is a tremendous fluctuation in the export of Canadian butter, also in its manufacture, due to the increased consumption of milk and cream in the larger cities in Canada and also demands from bordering cities of the United States. Many factories are equipped to make both butter and cheese, and make whichever pays the highest price. The United Kingdom is the great market, as may be seen from figures quoted below, also from the following statement taken from the Montreal "Gazette" Commercial and Financial Review for the year 1925:—

"The total quantity of butter imported into the United Kingdom (excluding imports from the Irish Free State) during the twelve months ended June, 1925, amounted to 277,898 tons, as compared with 224,009 tons in 1923-24, an increase of 53,889 tons, or 24 per cent. This was the largest quantity of butter received in any one year, being 48,837 tons more than the previous highest total of 229,061 tons in 1923. Deducting 18,545 tons of butter re-exported, the net imports were 259,353 tons. The quantity received from British sources amounted to 130,478 tons an increase of 52,640 tons or 67 per cent. From Australia a record total of 56,193 tons was received, as compared with 24,007 tons in the preceding year. Canada sent 4,881 tons and New Zealand 15,332 tons more, while from South Africa 241 tons were received, as against nil in the preceding year. Foreign supply amounted to 147,420 tons, a small increase of 1,249 tons. The supplies from Russia and Finland showed a great increase, the total amounting to 26,365 tons, as against 7,938 tons in 1923-24."

Imports of Butter by the United Kingdom, Calendar Years of 1922-23-24, from page 566 of Proceedings of the Special Committee, considering the Resolution to give the Government of Canada control of Ocean Rates, Ottawa, May, 1925.

Country of origin.	1922		1923		1924	
	Pounds	Percentage of total	Pounds	Percentage of total	Pounds	Percentage of total
Denmark	159,465,152	33.4	205,849,892	36.1	194,226,032	32.8
Finland	13,134,688	2.7	13,000,512	2.3	15,071,168	2.5
Sweden	1,854,048	0.4	4,390,624	0.8	6,457,248	1.1
Netherlands	8,804,880	1.8	19,548,216	3.4	10,316,208	1.7
France	2,369,584	0.5	10,571,568	1.8	1,538,768	0.3
United States	3,847,648	0.8	1,184,736	0.2	3,921,680	0.7
Argentina	39,889,696	8.4	55,020,672	9.6	60,340,448	10.2
Irish Free State	—	—	55,143,648	9.7	51,666,832	8.7
Australia	100,968,784	21.1	57,029,392	10.0	70,567,616	11.9
New Zealand	123,585,728	25.9	126,645,680	22.2	121,706,704	20.5
Canada	17,307,584	3.6	4,461,408	0.8	14,713,888	2.5
Other Countries	6,851,040	1.4	17,856,384	3.1	42,262,640	7.1
Total	478,078,832	100.0	570,702,732	100.0	592,789,232	100.0

These statements show the enormous market available in England, and the comparatively small percentage furnished by Canada. Canada is increasing its sales of butter in Japan and China, and also in Newfoundland and the British West Indies. The following table, also taken from the "Gazette" report, shows the shipments of butter from Montreal to different European ports, from 1920 to 1925 inclusive:

Shipments of butter from Montreal to the different ports for a period of years.

Ports	1925 Packages	1924 Packages	1923 Packages	1922 Packages	1921 Packages	1920 Packages
London	83,927	68,508	13,903	70,006	4,576	2
Liverpool	72,270	45,635	30,814	134,408	35,090	58
Bristol	54,460	50,910	10,277	37,290	14,409	1,995
Glasgow	15,477	17,819	4,741	26,955	9,952	—
Southampton	29,451	39,887	6,776	49,235	1,586	—
Cardiff	23,412	5,800	2,261	—	—	—
Manchester	22,055	24,232	2,475	—	—	—
Hamburg	14,651	—	—	—	—	—
Leith	4,307	—	—	—	—	—
Antwerp	215	5,685	6,017	250	2,746	1,302
Newcastle	200	497	—	—	—	—
France	—	—	—	—	2,000	7,000
Rotterdam	—	200	—	—	—	—
Total	320,425	259,174	77,254	318,144	70,369	10,357

CHEESE.

The first shipment of 50 boxes of factory cheese to England was made in the year 1865 from Ingersoll by the late Adam Brown of Hamilton who passed away in January 1926 in his one hundredth year. Reference has been made to the fluctuation and changes in the commodities shipped from the port of Montreal; the following table indicates the rise and fall of the cheese exports since 1868 (m).

(l) The cool St. Lawrence route is particularly suitable for the transport of perishable products. Freight is delivered directly from cars to ships without cartage or lighterage, and is, therefore, less liable to delay, damage or pilferage, all of which are practically non-existent at Montreal.
(m) From the Montreal "Gazette" Commercial and Financial Review, January 9th, 1926.

Year ended March 31st	Quantity Pounds	Value Dollars
1868	6,141,570	620,543
1878	38,054,294	3,997,521
1888	84,173,267	8,928,242
1898	196,703,323	17,572,763
1904	233,980,716	24,184,566
1914	144,478,340	18,868,785
1917	180,733,426	36,721,136
1920	126,395,777	36,336,863
*1923	114,548,900	20,828,234
1925	122,782,000	34,525,980

Great attention has been paid by the Department of Agriculture, Ottawa, and most of the Provinces, to improvement in the manufacturing, transportation, and marketing of this very valuable food product. The railways have co-operated in furnishing refrigerator cars, and the shipping companies by specially constructed boats, with the result that this is another commodity in which the port of Montreal leads the Continent.

LIVESTOCK.

Canada is a large grazing country with an exportable surplus of cattle. The past few years have seen a revival of the export cattle trade which had been dormant for a number of years. From the inception of the Canadian trade about fifty years ago, until the year 1913, owing to an age-long tariff wall at the American boundary, the only market was in Great Britain, where there is intensive competition. During that period, a large, and, to every appearance, permanent trade was developed which encouraged the local port authorities in Great Britain, and the steamship companies serving them, to spend several millions sterling in building specially equipped marketing and shipping facilities for the economical handling of the trade. Thus, in 1913, Canada had established in Great Britain as complete a marketing system as forty years of experience could suggest. For a few years prior to 1913, cattle exports decreased, the animals being required in Canada to feed the thousands of men engaged in railway construction. A similar period of business activity across the border resulted in a temporary shortage of beef animals in the United States and the removal of the tariff wall. This was a vital blow to export trade overseas, and the outbreak of the War a year later, put an end for the time being to a trade which took over forty years to build up. Between 1913 and 1919 all available Canadian stock was eagerly desired at fabulous prices by U.S. packing houses for conversion into beef for shipment to Europe to feed the Allied armies. In 1921, however, the Americans replaced their tariff fence on a scale higher than that prior to 1913. Canada was, therefore, left stranded without a market.

When the livestock shippers again turned to the British markets, they discovered that there were few ships available for the trade, although the ocean rates were \$45.00 per head, and that the lairage at the British ports especially Birkenhead, which had been built purposely for this trade, was now used for the accommodation of Irish cattle, which trade in the meantime had grown enormously, in round figures being about 1,000,000 head yearly. It has been a difficult matter to revive this business. When the cattle trade suddenly and unexpectedly resumed in 1921, the type of ship in the Saint Lawrence had not been built for cattle, and the steamship companies were averse to equipping or building ships for a trade which might not be permanent.

There was considerable opposition in Great Britain to the indiscriminate importation of Canadian cattle mainly on the part of British cattle breeders and importers of Irish cattle. From 1892 to 1923 Canada had not been allowed to ship "store" cattle into Britain (light cattle to be fed and fattened), but was allowed to ship cattle for immediate slaughter within ten days after arrival. These restrictions were alleged to be for fear of what is known as "foot-and-mouth disease," which does not exist in Canada, and it was the view of the Canadian shippers that every pretence was used to keep Canadian cattle out. Similarly in Canada, many dealers who had made huge fortunes during the short period they were permitted to ship into the enormous market in the United States looked across the border with longing eyes for the good old times. Owing to the strong protective policy of the United States, their market is uncertain, and in order to insure against a recurrence of upsetting conditions by again taking Canadian cattle for a short period, it has been suggested that the Canadian Government should provide the necessary machinery so that if any temporary tinkering takes place in the U.S. tariff, Canada should impose export duties which would retain the present conditions and the permanence of the overseas export trade.

Only certain ports in the British Isles have authorised facilities for landing cattle, and, with the exception of Dundee, are all on the west coast, being Glasgow, Birkenhead, Manchester, Cardiff and Avonmouth. The real market is

London; and the Imperial Shipping Committee submit that facilities should once more be provided at London and Hull.

Since the establishment of the Irish Free State in 1921, the United Kingdom has not been quite so interested in the preservation of the Irish cattle trade, with the result that more Canadian cattle have been imported into Great Britain. The cattle shippers still claim that a reduction in the rate on cattle, especially in the winter to offset the additional rail haul and cost, would give a tremendous stimulus to the business, and there are plenty of cattle, and every indication that the present business could be doubled or trebled.

An economically built ship of 8,000 tons with permanent fittings can handle five hundred cattle. A speed of from ten or twelve days is preferred. Some boats take as many as 800 head. The owner supplies the feed and three or four men per 100 cattle, according to conditions.

Canadian Cattle Exports.

	United States	Gt. Britain	Total
1920	500,216	479	500,695
1921	295,279	131	295,410
1922	172,317	35,418	207,735
1923	96,873	56,649	113,522
1924	97,847	82,086	179,933
1925	86,748	110,257	197,005

The embargo on Canadian cattle was removed in 1923, although it is still brought up for discussion in England (n).

LUMBER.

Competition in the United Kingdom is very keen, the market having been to a certain extent disorganised by the very large shipments of Baltic woods. It is more and more difficult for Canadian exporters to sell their goods, especially spruce, in England in competition with Norway, Sweden, Finland and Russia. In 1925, the demand for lumber generally in the United Kingdom was good, but Canadian spruce prices were too high to obtain a substantial share of the business. Canada's white pine exports about maintain their own, but there has been a great falling off in spruce, even although the steamship companies reduced the freight rates in order to improve the situation. Lumber and timber represented a large tonnage from Eastern Canada, as is shown by the comparative tables, but British Columbia is now exporting very largely not only to Great Britain by direct boats, but also by water to Eastern United States and Canada, in addition to the extensive market in Australia and the Far East.

The total exports of lumber from Montreal during 1925, with comparative figures for the four preceding years:—

1925 Ft. B.M.	1924 Ft. B.M.	1923 Ft. B.M.	1922 Ft. B.M.	1921 Ft. B.M.
57,572,000	61,926,000	66,600,000	61,544,000	39,272,000

PULP AND PAPER.

The pulp and paper industry is now the most important manufacturing industry in Canada. It represents an investment of more than half a billion dollars and an annual output exceeding \$200,000,000 in value. It ranks second only to agriculture in its contribution to Canada's foreign trade, its exports in 1925 amounting to \$154,555,951.

Canada is the largest producer of newsprint paper in the world, exceeding 1,500,000 tons a year. Over 90 per cent. of its newsprint production is exported; about 85 per cent. goes to the United States and the balance is divided between Australia, New Zealand, South Africa and the Argentine. Canada is also a large exporter of groundwood and sulphite pulps. Some of the highest grades of sulphite used in the manufacture of artificial silk (rayon) are now produced in Canada and exported to the United States, Great Britain and Europe. Few Canadians realize that by the end of 1926, Canada will be producing over one-third of the world's newsprint and 45 per cent. of the raw material entering into newsprint manufacture. This enormous development has had a marked effect on the business done through Montreal and the lower ports. In 1913, the total production of newsprint paper in Canada was 350,000 tons. This had grown to 1,522,217 tons in 1925, and the figure will be considerably increased in 1926.

AUTOMOBILES.

The movement of automobiles through Montreal is increasing in such proportions that shippers of other commodities in some instances were unable to get the ocean space they required in 1925. If this traffic continues to increase it will mean additional ships on some of the trade routes; in fact, in conjunction with the increased paper tonnage it is already responsible for additional steamers between Montreal and Australia.

(n) Information from Mr. Donald Munro, Livestock Exporter, Montreal and Canadian Pacific Railway.

(o) Figures compiled by Dominion Bureau of Statistics, External Branch, Ottawa.

* In 1923 the exports from New York were 8,331,321 lbs., valued at \$2,179,367, N.Y. Produce Exchange Report, 1924.

In Canada, according to the figures compiled by the Dominion Bureau of Statistics, the automobile industry in value of products ranks seventh among the forty leading industries of the country. A total of 71,909 motor cars manufactured in Canada were exported from the Dominion during the twelve months ending November 30th, 1925, compared with 346 in the twelve months ending March 31st, 1910. The increase in the value was tremendous, viz: from \$405,011 in 1910, to \$32,008,812 in 1925 (o). The total exports of automobiles and parts through Montreal in 1925 amounted to 142,085 tons. The rail freight rates from Detroit, Windsor and Ottawa are lower to Montreal than to New York, and there is also less risk of delays.

SPECIMEN EXPORT CARGOES.

S.S. "Grey County," May 8th, 1925, to Havre:

54,091 bushels wheat; 455 pieces timber; 2 cases cotton goods; 1 case sundries; 3 bales woollens; 2 cases silks; 21 packages; 1,800 bundles hides; 192 rolls paper; 4,968 packages implements; 1,289 billets copper; 269 cakes copper; 12 cases drygoods; 50 cases catsup; 14 barrels graphite; 14 boxes engines; 600 bags asbestos; 1,220 bales woodpulp; 1 case canoes; 37 boxes mica; 1,118 bags w. shanks; 2 boxes books.

S.S. "Bretta," May 8th, 1925, to Cardiff and Bristol.

59,600 bags of sugar.

S.S. "Canadian Victor," May 8th, 1925, to Cardiff and Swansea:

175,349 bu. wheat; 28,235 bu. oats; 6,424 bags sugar; 1,236 bbls. scrap tin; 94 bbls. zinc dross; 4,900 pcs. birch; 189 bxs. bacon; 1 cs. lawn mowers; 1 bx. maple syrup; 11cs. curtain rods; 5,700 bxs. lard; 700 bxs. tongues; 150 cs. mutton; 500 cs. ketchup; 222 bbls. nickle oxide; 300 bxs. meats; 600 cs. ev. milk; 250 bxs. pork; 188 drums phosp.; 5 reels cables; 272 bxs. cheese.

S.S. "New Aster," May 8th, 1925, to Limerick, Ireland:

178,000 bushels wheat.

S.S. "Manchester Regiment," May 9th, 1925, to Manchester:

727 head of cattle; 1,250 sacks flour; 16,977 pcs. pine; 1,941 bxs. cheese; 4 cs. advt. matter; 10 cs. empty jars; 579 coils wire; 50 rolls wire fencing; 26 bxs. bolts; 40 bxs. steel nails; 7 steel loco. tires; 1 bx. maple syrup; 24 bbls. zinc ashes; 2,309 bales hay; 101 bales straw; 646 bags cattle feed; 60,600 maple blocks; 1,200 cs. wheat flakes; 7 bales cotton waste; 152 pkgs. wrapping paper; 3 cs. machinery; 21 reels cable; 639 bbls. acetic acid; 488 drums of cs. phosphorus; 300 bags oatmeal; 732 bbls. apples; 346 bxs. cnd. beef; 2,000 cs. evap. milk; 550 cs. cnd. pork; 9,350 boxes lard; 15 cs. tongues; 350 tierces lard; 14 bbls. steel bars; 456 pkgs. agric. implements; 1,000 bags oatmeal; 2,131 bbls. maple floorings; 10 bxs. meat; 7 cs. sheet copper; 67 bxs. auto. tires.

S.S. "Regina," May 9th, 1925 to Liverpool:

28,234 bu. oats; 2,201 bxs. cheese; 100 froz. lambs; 266 bales leather; 80 cs. rubber shoes; 5 pkgs. H. H. effects; 6,175 pcs. square timber; 90 pcs. lumber; 2,672 bales hay; 6 bales fur; 20 pkgs. gen. mdse; 60 bars silver bullion; 6 cs. patent leather; 3,109 bbls. pulpboard; 2,388 bxs. cured meats; 389 bxs. froz. meats; 87 pkgs. aluminium; 8 cs. silk-knit garments; 1,225 bbls. hardwood lumber; 3 cs. H. H. goods; 8,700 bxs. lard; 1,133 cs. match splints.

S.S. "Doonholm," May 10th, 1925, to New Zealand and Australia.

10 cases shoes; 3 cs. shoe braces; 10 bbls. steel wire; 514 kegs nails and staples; 288 bars iron; 20 cs. drug sundries; 1 cs. vas. cleaner parts; 177 cs. gl. lamp chimneys; 45 cs. macaroni; 10 cs. ranges and parts; 2 bxs. bolts and nuts; 275 pkgs. galv. pipe; 192 rolls wire fencing; 37 bxs. steel nails; 200 bags salt; 45 drums naphtha; 11 cs. rubber goods; 4 cs. wood screws; 59 bxs. auto tires and tubes; 34 cases dry batteries; 2 cs. wood machinery; 4 cs. rubber belts; 25 cs. cnd. corn; 4 cs. underwear; 320 pkgs. kraft wrapping paper; 10 bls. kraft wrapping paper; 115 rolls kraft w. paper; 340 cs. cd. pears; 57 pkgs. ranges; 10 cs. maple skewers; 1 cs. rubber boots; 97 pkgs. rubber goods; 300 drums carbide; 318 pkgs. galv. pipe; 17 bxs. tacks; 2 cs. suspenders; 4,685 pkgs. agricultural implements; 20 crts. millboard; 640 cls. steel wire; 244 rolls N.P. paper; 29 bx. autos; 12 bx. batteries; 142 pkgs. solid R. tires; 7 bxs. R. Heels; 34 rolls print paper; 31 bls. pneu. castings; 24 cs. ft. wear; 1,040 reels barb wire; 640 cls. galv. wire; 9 bxs. pianos; 3 cs. brass valves; 20 bbls. steel wire; 46 cs. canvas shoes; 54 bxs. range parts; 120 drums carbide; 250 cs. clothes pegs; 4 cs. elect. ranges; 1 cs. photo paper; 32 bxs. batteries; 71 pkgs rubber boots; 433 cls. steel wire; 10 kegs coop spring pins; 10 cs. peas; 12 bxs. con. mixers; 521 kegs steel nails; 52 cs. gl. lamp chimneys; 50 bags aliske seed; 320 reels barb wire; 201 coils steel wire; 2 cs. razor parts; 6 bbls. chains; 44 cs. bronze powder; 7 cs. elect. goods; 6 bls. wallpaper; 2 cs. toys.

S.S. "Aldermi," May 13th, 1925, to Rotterdam.

112,326 bushels wheat; 81,268 bushels rye; 21,119 bushels oats.

S.S. "Essex County," May 12th, 1925, to Hamburg.

72,000 bu. wheat; 59,969 bu. rye; 34,029 bags flour; 439 cs. pegwood; 50 bbls. pork; 67 logs; 75 bbls. graphite; 17 bales waste; 13 pkgs. implements; 13,974 bars copper; 366 billets copper; 69 trcs. castings; 3,200 cs. con. milk; 50 bxs. cheese; 17 bales rags; 1 bag beaver castorium.

S.S. "Nayarit," May 14th, 1925, to Cornerbrook, Newfoundland:

83 pcs. and bxs. structural iron and bolts; 203 bales hay; 50 brls. flour; 60 pcs. settlers effects; 1 auto; 2 pine doors; 1 bx. glass; 5 rolls linoleum; 18 cs. elect. apparatus; 11 drums asphalt; 1 cs. C.I. valve; 1 car. sul. acid; 1 pkg. alum. fittings; 1 bx. marble; 305 cs. cond. milk; 1 brl. copper; 1 cs. brass tubing; 33 steel plates; 10 bxs. glass lamp shades; 3 bxs. pipe fittings; 1 bx. br. valves; 6 cs. w. house scales; 1 bx. hardware; 10 bdl. tubing; 22 bdl. steel hoops; 1 cs. extinguishers; 10 brls. flour; 200 bags hyd. lime; 85 cs. St. C. milk; 5 cs. varnish; 10 crts. furniture; 62 bxs. plumbing supplies; 1,041 bars steel; 11 bdl. iron pipe; 3 tanks; 62 bxs. elect. apparatus; 2 bxs. knives; 330 bdl. chain; 10 sprocket wheels (p).

The fluctuations in imports are as considerable as in exports. The wharves are no longer lined with green and red boxes of De Kuyper gin during the opening and closing weeks of navigation. The Mediterranean orange and lemon boats, which attracted purchasers from as far west as Chicago, St. Louis and Winnipeg, have long discontinued coming to Montreal, having been unable to compete in quality and price with the daily carload arrivals of fresh fruit from Florida and California. There are no cargoes of steel rails or cement, which are to-day manufactured in Canada. Fire brick and scoria blocks still come but in reduced quantities. Galvanised iron, tin plate, iron and steel have their ups and downs. English and Scotch woollens have retained their Canadian market. There is still quite an import tonnage of sheet glass; also of raw materials such as glass, sand, sulphur, raw sugar and molasses. The chief increase is in the imports of crude oil of which about 414,633 tons were brought in through the port in 1925. The largest import tonnage is British anthracite coal which is a revival of an old trade which had become extinct. This started with a small number of ships in the late autumn of 1922. There were 47 in the following year, 55 in 1924, and 94 in 1925. In 1925, 440,735 tons of British coal arrived in Montreal.

A representative Import Cargo from London to Montreal, November, 1925 (q).

Commodity	Tons weight	Tons measure
Whiting	61	—
Tea	18	26
Toilet Powder	—	3
Crinkling Paper	—	5
Beans	1	—
Copper Oxide	3	—
Confectionery	—	2
Loud Speakers	—	1
Electro-Plate	—	1
Furniture	—	3
Celluloid Goods	—	3
Stationery	—	1
Dates	1	—
White Pepper	15	—
Strawboard Cuttings	74	—
Miscellaneous	18	43
Fullers Earth	45	—
Canned Goods	22	—
Gypsum	2	—
Sisal	299	—
Seeds	35	—
Biscuits	—	6
Machinery	7	25
Tobacco	—	3
Pineapples	12	—
Agricultural Implements	—	2
Oxo	—	7
Wireless Instruments	—	4
Currants	36	—
Sultanas	9	—
Total	658	135

Traffic handled on Montreal Wharf (r).

Year	Imports Tons	Exports Tons	Local Tons	Total. Tons
1920	1,432,782	2,528,538	801,577	4,762,897
1921	851,444	4,122,253	1,250,227	6,223,924
1922	1,702,590	5,043,877	1,838,674	8,585,131
1923	1,421,295	4,270,226	1,815,351	7,506,872
1924	1,472,933	5,594,310	1,918,346	8,985,589
1925	2,965,557	5,283,681	888,043	9,137,281

(p) From "Shipping Register and Travel Guide," Montreal, May, 1925.

(q) Authority: Canadian Pacific Railway.

(r) Figures obtained from Board of Harbour Commissioners, Montreal.

Cargo tonnage of imports and exports (in cargo tons of 2,240 pounds) for certain ports (s). Per calendar year except as shown.

	1922	1923	1924	1925
New York ...	22,762,101	21,275,288	21,163,909*	22,222,965*
Montreal ...	8,585,131	7,506,872	8,985,589	9,137,281
New Orleans ...	7,147,313	7,216,287	6,956,408*	9,401,331*
Philadelphia ...	6,324,414	6,242,662	5,539,285*	5,736,805*
Baltimore ...	5,619,024	6,617,605	5,602,454*	5,485,071*
Boston ...	4,257,005	3,024,811	2,492,422*	2,302,303*
Galveston ...	3,016,788	2,823,497	2,660,390*	3,143,701*
San Francisco ...	2,506,051	3,012,857	2,738,490*	2,681,199*
Vancouver ...	1,929,805	2,658,564	3,690,732	3,065,193
Los Angeles ...	945,116	2,788,021	3,312,864*	3,751,700*

* Fiscal Year: June 30th.

EXPANSION OF CANADA'S EXPORT TRADE.

With reference to the expansion of Canada's export trade, it is interesting to note that during the past fifteen years the increase in the production of wheat in the Prairie Provinces has been so rapid that Canada has definitely established its position among the principal wheat producing countries of the world. The increase in production during recent years has been so great that the exportable surplus of wheat for the fiscal year 1925 was valued at \$251,665,844, compared with a total export of all commodities in 1910 of \$279,247,551. In fact, in 1925 our wheat exports were 90 per cent. of what our total exports were in 1910. Canada has also made great strides during the past fifteen years in the production and export of many other commodities, raw, semi-manufactured and fully manufactured. The following table has been compiled to show the extent of the expansion of the export trade during the past fifteen years for certain leading commodities, also the increase in the number of countries to which these leading commodities were exported (t).

Exports of principal commodities, 1910 and 1925.
From Canada.

	Years ended March 31		Number of Countries to which exported	
	1910	1925	1910	1925
Total Canadian Exports ...	279,247,551	1,069,067,353	69	108
Wheat ...	52,609,351	251,665,844	10	28
Printing Paper ...	2,612,243	92,007,594	23	33
Wheat Flour ...	14,859,854	70,638,692	36	73
Planks and Boards ...	33,100,387	61,356,009	36	43
Wood Pulp ...	5,204,597	41,565,241	8	6
Fish ...	15,179,015	33,237,745	51	86
Gold Dust, Nuggets, etc. ...	6,016,126	28,793,333	4	2
Automobiles ...	405,011	26,030,389	10	85
Cheese ...	21,607,692	24,112,475	20	33
Bacon and Hams ...	6,848,145	22,392,223	12	20
Barley ...	1,107,732	18,120,571	9	9
Furs, undressed ...	3,749,005	16,960,675	8	14
Oats ...	1,566,612	16,044,436	12	25
Pulpwood ...	6,076,628	14,137,774	1	1
Cattle ...	10,792,156	13,372,861	8	10
Silver ore and bullion ...	15,009,937	12,347,582	5	5
Copper ore and blister ...	6,023,925	11,469,493	2	2
Farm Implements ...	4,319,385	11,342,712	35	62
Whiskey ...	1,010,657	11,129,118	36	45
Nickel ...	3,320,054	10,174,245	2	12
Laths (wood) ...	1,882,950	9,637,240	11	6
Shingles (wood) ...	2,331,443	9,423,184	13	12
Butter ...	1,010,274	8,715,962	19	24
Sugar, refined ...	6,213	7,939,504	9	18
Lead, pig ...	396,982	7,911,700	6	12
Asbestos, raw ...	1,886,613	7,742,739	9	11
Rubber Tyres ...	—	7,409,608	—	75
Leather, unmanufactured ...	1,296,480	7,383,888	15	27
Hides and Skins, raw ...	5,508,185	7,163,894	5	10
Rye ...	84,658	6,979,414	6	10
Flax Seed ...	3,642,476	6,765,767	5	3
Apples, green ...	4,417,926	6,316,020	25	29
Cream, fresh ...	—	5,520,853	—	1
Condensed Milk ...	541,372	5,190,831	20	37
Aluminium in bars, blocks, etc. ...	1,202,723	5,135,366	9	16
Machinery ...	924,510	5,043,587	35	59
Ale, Beer and Porter ...	2,687	4,860,984	5	23
Bran, shorts and middlings ...	1,842,620	4,507,254	17	18
Coal ...	5,013,221	4,388,766	21	32

(To be continued).

Italian Harbour Developments.

PORT COMPETITION.

In the Adriatic, shipping and business circles are looking forward to the settlement of the question of competition between Trieste, Venice and Fiume, and North European ports

(s) U.S. imports consist mainly of raw materials. In 1925 their leading export commodities were, in the order named: raw cotton, automobiles, gasoline, leaf tobacco, wheat, refined copper, lard, coal and coke, lubricating oil, and flour. The shipments of raw cotton were more than three times the value of automobiles and parts. 1925 exports showed a total increase of 6.9 per cent. over 1924, although there was a decrease of 37.3 per cent. in wheat according to the Foreign Commerce Department of the Chamber of Commerce of the United States. The figures for American ports are from comparative statements published by the U.S. Shipping Board Bureau of Research. Courtesy of Mr. M. M. Mahoney, Department of External Affairs, Canada, Washington, D.C.

(t) Department of Trade and Commerce, Ottawa, 1925, p. 12.

particularly with reference to Hamburg and Bremen since a conference has been opened between Italy and Germany to arrive at an agreement on this subject through the division of Central Europe into various zones of influence. However, in the meantime Adriatic shipping people are doing their best to cut down the cost of transportation from Central Europe to overseas ports through Trieste, the expenses at the various frontiers, and to increase the speed in the transportation through the creation of direct freight trains, better steamship services, etc. The contribution of the new General Bonded Stores Administration to the progress of Trieste has been rather large, as they have secured considerable funds for this purpose, and started the construction of four large warehouses, while the number of cranes is being increased, and the old hand carriages are now replaced with new electric carriages to take the goods in the interior of the warehouses.

At Fiume the Royal Commissioner for the port has taken up the question of a molasses unloading station, owing to the projected imports of molasses from Dutch East India, on behalf of the Arco Alcohol Co. of Zagreb, while both there and at Trieste the construction of new large grain silos is being considered as necessary.

During the course of the past months the absurdity has become apparent of the division of the old Dock Nazario Sauro (now Port of Sussak) from the port of Fiume. The old Dock Nazario Sauro has about 800 metres of quayage without any warehouse of importance; the port of Fiume has about 3,000 metres of quayage, so that when eight steamers are in the Port of Sussak the others are to be kept waiting in the open seas, as happened a couple of weeks ago to two British ships, with danger to both.

DEVELOPMENT AT VENICE.

What has, however, struck the eye of the observer is the great development of the Port of Venice, which has reached practically the pre-War figures, and where large extensions are being carried on particularly with reference to new 1½ and 3-ton cranes as well as electric coal elevators, while it must be admitted that large developments have been carried on at Venice—Marghera, the new section of the Port of Venice, where the coal trade will be transferred in the course of the next few months, while the old section of the harbour is to be employed as a general cargo dock.

The development of political and commercial relations between Italians and Albanians in the Adriatic has led certain Italian concerns to put up an organisation to build the Port of Durazzo which will be connected by the first Albanian railway to Tirana, the capital of the Republic of Albania. A credit of 50 million lire gold has been allotted for this purpose by the S.V.E.A., and the first works have already been started.

In accordance with the idea of further exploiting Sardinia the Italian Government has authorised the necessary finances to build about 2,000 metres of quayage, which are about to be completed, and 17 cranes and two electric elevators of a certain power are under construction at the Officine di Battaglia (Padova) for this new harbour.

NEW DOCKS FOR GENOA.

The Consorzio Autonome del Porto di Genova has secured the necessary loans to complete the new dock Vittorio Emanuele III., and to start the building of the new Benito Mussolini Dock along the shore of Sampierdarena, which will raise the capacity of the Port of Genoa to about 20,000,000 tons yearly, and in the meantime works are being completed to ensure that during rough weather waters in the inner harbour should remain quiet. The construction of the first part of the Maritime Passenger station on the Ponte dei Mille is being completed.

In the course of the period from December to January further reductions have been carried on in the greater part of the Italian ports as far as unloading charges are concerned, and it is expected that others will shortly be made, particularly in the Adriatic.

THE FREE PORT SYSTEM.

Now everybody is awaiting the decision which will be taken with reference to the suggestions of the committee which will be appointed by the Ministry for Communications with reference to the extension of the free port system to large Italian ports, such as Genoa, Leghorn, Venice, Naples, etc., but it appears that the committee have still to visit certain ports, such as Messina, Cagliari, Ancona, Bari and Brindisi, and that, consequently, until they have visited these harbours they will not be able to complete the reports to the Government.

The facilities of Italian ports have increased of late, not only with reference to quayage, warehouses, etc., but, as far as I understand, also in respect of steamship services, since I am informed that in consequence of an agreement made among the various Italian lines a weekly sailing has been established between Italy and New York, and vice versa, while as soon as the m.s. *Vulcania* and the t.s.s. *Conte Grande* are delivered the same arrangements will be made also as far as South America is concerned.

The Ports of Rumania.

II.—The Ports of Galatz and Braila, and the Sulina Mouth.

By ROY S. MAC ELWEE, Commissioner of Port Development, Charleston, South Carolina, B.S., M.A., Ph.D. Maps and Drawings by HENRY F. CHURCH, Assistant Commissioner Bureau of Port Development, Charleston, South Carolina.

(Continued from page 106.)



Administration Building, Port of Galatz.



River Craft at Galatz.

THE SULINA MOUTH OF THE DANUBE.

THE ports of Braila and Galatz are situated respectively one hundred and seventy and one hundred and fifty kilometres from the Sulina mouth of the Danube (106 miles and 97 miles). The great delta of the Danube extending from just below Galatz to the Black Sea, similar to the Delta of the Mississippi, has numerous arms and branches. The northern or Kilia branch is the seat of the caviare fisheries, but is not of consequence to navigation. The middle or Sulina branch is the one that was chosen by the European Commission of the Danube, in 1856, and has been corrected and improved until to-day. Large works are now going on to further improve this entrance. The Southern or St. George branch is one that is held in reserve in case the works permitting vessels drawing 24 ft. to enter the river at Sulina are not continuously successful in maintaining the depth.

AIDS TO NAVIGATION AT THE SULINA MOUTH.

The entrance channel of the Sulina branch is approached between jetties, running northeast by east, the first approach of lights is a bell-buoy with white flashes, anchored at the 35 ft. contour. The main channel entrance is marked by channel buoys on the right and a bell-buoy at the entrance of the jetties, the right jetty being marked by a provisional light with red flashes. The entrance to and through the jetties is in a straight course, both the new jetty extension and the old south jetty. There is a high power lighthouse at Sulina, on the shore to the south of the channel. The channel now has a minimum depth of 24 ft.

WORK OF THE EUROPEAN COMMISSION OF THE DANUBE.

This Commission, in 1856, was charged with the duty of constructing channel correcting works that would relieve the obstructions to navigation at the mouth of the Sulina River. By building a primitive type of training jetties, from 1858 to

1861, the depth across the bar was increased from 9 to 17 ft. and subsequently was gradually increased to 20½ ft. Thereafter the scour of the river was sufficient to maintain a depth of 20½ ft. for a period of 22 years, between 1873 and 1894 without having recourse to any further dredging work. In 1894, the effort was begun to increase the depth to 24 ft., by means of a steam ladder-bucket dredge, which removed about 220,000 cubic metres (286,000 cubic yards) of spoil per annum, until 1906. In 1907, a powerful suction dredge was put on the job to remove alluvial deposits of silt. The two dredges until 1914 were unable to maintain a constant depth of 24 ft. although about 445,000 cubic metres (579,000 cubic yards) of material were removed annually. In 1912 a second suction dredge was put to work further up the river. Beginning with 1915 this third dredge came down and worked on the job of maintaining the depth at the mouth of the river, but it was still unable to keep the channel at 24 ft.

This inability to maintain the entrance was due to the building out of the delta and the strong sand drift north and south along the shore. In addition to the deposits of silt by the river, the sand drifts were extremely annoying. However, this is an excellent example of the axiomatic engineering fact that it is almost impossible to maintain a dredged channel deeper than the natural contour beyond the jetties protecting a river mouth. Jetties must be carried out to a contour greater than the required channel depth.

The Treaty of Versailles of June 28th, 1919, Article 346, continued the European Danube Commission in force as heretofore.

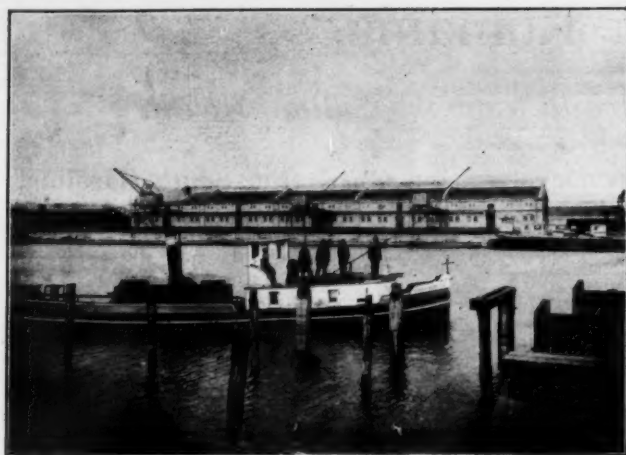
The Commission of the Danube in 1920 compromised with the plans of Mr. M. E. T. Ward, the Chief Engineer of the European Commission, and authorized the necessary extension of the training jetties, but only for a length of 6,500 ft. out to the 21-ft. contour. We may add here that the extension of the training jetties to a 21 ft. contour would not accomplish the results because it is not to be expected that the training jetties will maintain the channel beyond their ends below the



View of River Quay, Port of Galatz.



Grain-loading Spouts, Basin Dock, Galatz.



Grain Elevator, Basin Dock, Galatz.

natural contour of the sea bottom. If a 24 ft. depth was to be maintained, the jetties should be extended to the 25 ft. contour line of the ocean bottom, as Mr. Ward originally suggested.

The consulting committee, of the Danube Commission, included several very estimable gentleman; for France, Mr. Chargueraud; for Great Britain, Mr. Maurice Fitzmaurice; for Italy, Prof. Senator Luigi Luiggi; for Rumania, Prof. Georges Popesco.

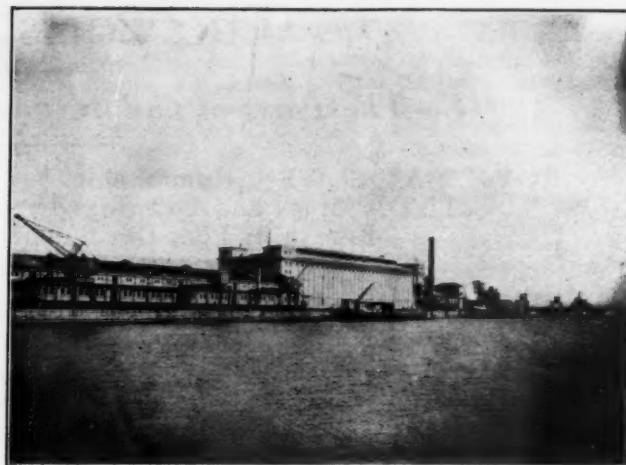
By 1923 and 1924, the total annual dredge work had reached 1,000,000 cubic metres per annum. By September 30th, 1924, the new jetties had reached a total distance of 5,732 ft. (1,747 metres) on the north side, and 5,650 ft. (1,722 metres) on the south side of the channel measured from the end of the old jetties. By October of the same year, they were extended to 5,895 ft. (1,797 metres) and the south jetty 5,866 ft. (1,788 metres). The new approach channel was opened to traffic on July 25th, 1925, with a minimum depth of 20 ft. On the 27th of July, the depth was 21 ft., by the 31st of July, the depth was 22 ft., by the 11th of August 23 ft., by 1926, the depth was increased to 24 ft., the channel width of 200 ft. maintained.

It was then found that the jetties were still not long enough, as the results were disappointing due to the fact that the current at the end of the jetties was not sufficient to scour the channel. The Special Committee of the E.C.D. then met again with the personnel as follows: France, Mr. Louis Perrier; Great Britain, Mr. A. T. Goode; Italy, Mr. Luigi Luiggi; Rumania, Mr. Popesco. It was decided to adhere to Mr. Ward's original plan to extend the jetties to a deeper contour and curved somewhat to the south in order to deflect the current of the ocean in case of wind and storm conditions. Work is now going on to extend the jetties the additional two thousand feet and curve them to the south on an 8,000 ft. radius. The jetties are on 600 ft. centres and the channel 200 ft. wide.

The Commission, however, is not particularly enthusiastic about the idea of such enormous work to maintain only a 24 ft. depth and even has a doubt as to the possibility of maintaining that channel in view of the fact that a port to-day is considered second-rate that has not a low water entrance of 30 ft. or better. The Commission is therefore giving serious study to the possibilities of developing the St. George mouth branch of the Danube, with the idea that this mouth emptying as it does into the Bay of Portitea is not subject to the same sand drifting as the two northern branches although the same percentage of silt would probably be deposited.

CONSTRUCTION OF THE SULINA JETTIES.

The Sulina jetties are constructed by dumping rubble (broken stone) upon willow mattresses and protecting the sea side



Merchandise Quay and Transit Sheds, Basin Dock, Galatz.

with 2½ ton stone blocks cut and dropped at random. For the construction of the mattresses willows are cut by contractors twenty-four to forty-eight miles distant from Sulina and made into bundles or faggots fifteen centimetres to twenty centimetres in diameter. These are towed in rafts to the dock yard at Sulina. Here the faggots (*fascines*) are made into the mattresses as follows: First, a checker board or grill of fascines is constructed, the crosses being on one metre (3.29 ft.) centres. Three layers of fascines, fifteen centimetres in diameter are laid over these frames and a second grill placed on top of the layer making altogether a mattress with two way bracing both top and bottom, and a third layer filling, a total thickness of approximately 1.20 metres (4 ft.). The mattress is then launched and towed to the point of submersion. Here work-boats with powerful windlasses are anchored off four corners of the mattress and the windlasses draw the mattresses into position above the point of submersion. The mattresses are then loaded with rock and sunk to the desired spot. From that point on, the broken stone (rubble) is dumped upon the mattresses until the jetty emerges from the surface of the ocean. The natural 2½ ton stone blocks are dumped on the exposed surface.

To aid in aligning the next succeeding mattress two rows of dolphins of seven piles each are driven through the mattress after sinking. These dolphins act as moorings and as bridge piers for the runways of the barrows of the workmen dumping rubble. The rubble is dumped on a slope of three to one, but severe winter storms on occasions have flattened out the mound before facing was possible.

The work has encountered considerable difficulties due to high currents, as much as four knots, to the constant storms of the Black Sea, which gives the sea its name of "black," and to the frequent severe weather in the winter time.

It might be added here that the Rumanian valley and Delta of the Danube is very similar in climate to that of the Great Lakes area, the great American wheat and corn country. It is hot in summer and sometimes very cold in winter, with delightful spring and autumn seasons.

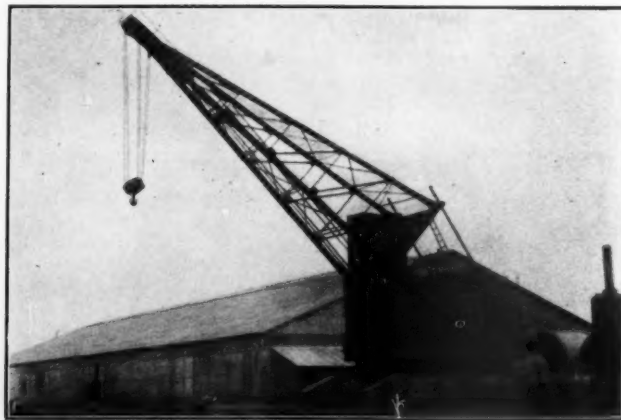
Full descriptions and photographs of the engineering work in extending the jetties at the Sulina mouth of the River Danube will be found in *The Dock and Harbour Authority* of March, 1925, October, 1925, and September, 1926.

THE PORT OF GALATZ.

Galatz with a population of about 125,000 is the principal port of importation of general cargo and the principal port of exportation of lumber of Rumania. The port is divided into five principal parts: (1) the old port, the port proper; (2) the new basin for general commerce, grain and lumber export; (3) the dock enclosures of the winter port; (4) the industrial port



New Wharves and Cranes, Port of Galatz.



East Quay of the Basin Dock, Galatz, with 40-ton Electric Crane.

PORT OF GALATZ.

UNDER THE ADMINISTRATION OF THE BUREAU OF PORTS & WATERWAYS, DEPARTMENT OF PUBLIC WORKS, BUCHAREST.



HANDLING EQUIPMENT.

MAIN PORT

- 2 Floating Grain Elevators, capacity 60 tons per hour.
- 1 Floating Crane, capacity 40 tons.
- 15 Landing Pontoons.

BASIN DOCK

Loading Platforms for lumber & coal:—37,000 square metres.

1 Crane, capacity 40 tons

1 " " 3 "

4 " " 3 "

1 " " 2½ "

7 " " 1½ "

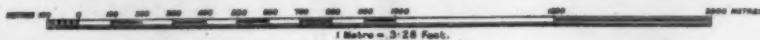
2 Travelling Loading Elevators.

2 Floating Elevators for trans-shipment of grain in stream.

DRY DOCKS

The Port has 2 Floating Docks with capacities up to 2000 tons displacement.

Scale for General Plan.



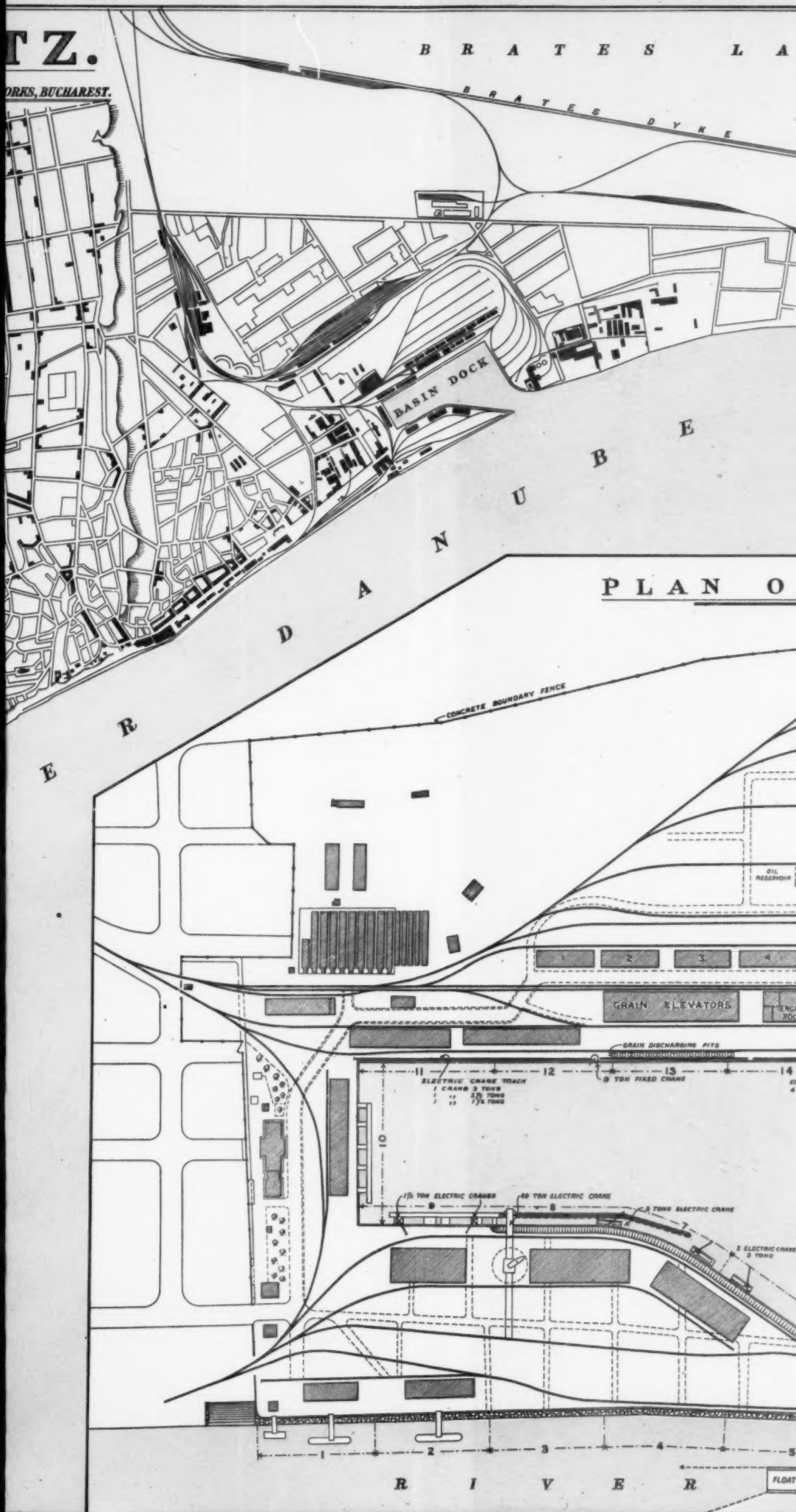
THE DOCK AND HARBOUR AUTHORITY

T Z.

DOCKS, BUCHAREST.

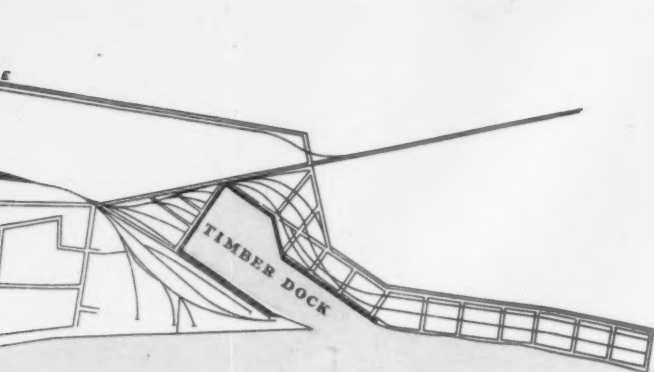
B R A T E S L A

B R A T E S D Y K E



THORITY - MARCH, 1928.

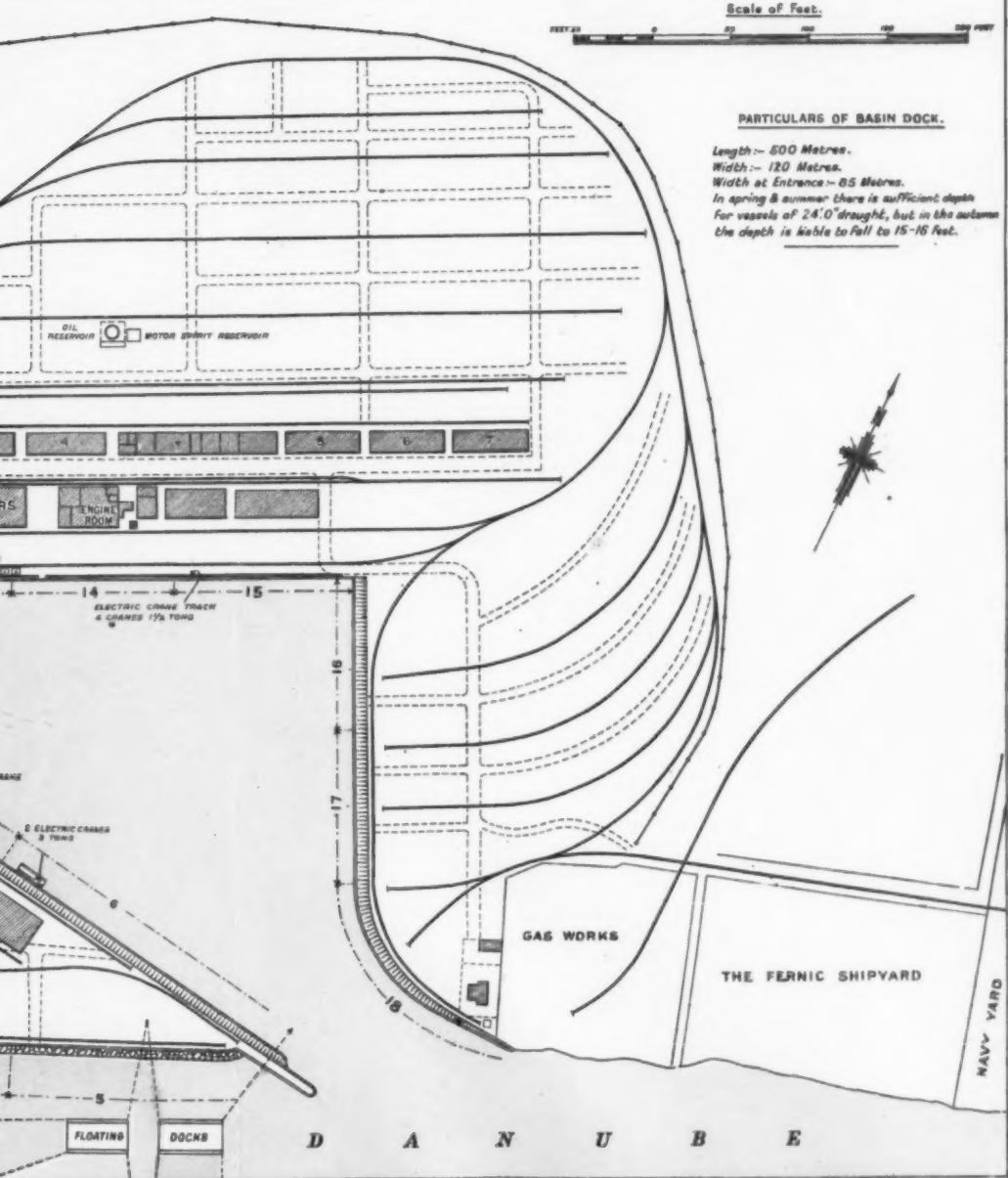
L A K E



PARTICULARS OF TIMBER DOCK.

Length:- 530 Metres.
Width at Western End:- 260 Metres.
" " Entrance:- 100 Metres.
Minimum Depth of Water:- 2 Metres.
Height of Quay Walls:- 12 Metres.
Walls are built of Masonry with sloping face &
Stages are required for ships to come alongside.

OF THE BASIN DOCK.



PARTICULARS OF BASIN DOCK.

Length:- 500 Metres.
Width:- 120 Metres.
Width at Entrance:- 85 Metres.
In spring & summer there is sufficient depth
for vessels of 24'0" draught, but in the autumn
the depth is liable to fall to 15-16 feet.

SUPPLEMENT TO THE BOOK

OF GALATZ.





Administration Building, Port of Braila.



Some of the 38 Floating Elevators, Braila.

area; (5) ten kilometres of the bank of the river accessible for laying alongside, and available for future development and for possible equipment as a free zone.

The general characteristics of both ports, Braila and Galatz, are similar to those of Giurgiu only upon a larger scale with deep water and full equipment for a deep sea port. There is the long river bank with stone revetments and landing pontoons, breasted off from the shore by means of booms and connected by bridges to the land. There is the interior basin with its vertical quay walls and full modern port equipment of tracks, cranes, transit sheds, warehouses, grain elevators, etc.

THE MAIN PORT.

The length of possible landing space along the Danube is: State owned, with revetments, 2,100 metres (6,910 ft.); with unimproved river banks, 1,000 metres (3,290 ft.); total 3,100 metres (10,200 ft.). Privately owned, river banks, 300 metres (987 ft.). This makes a total for public use of 3,400 metres. Transit sheds along the river comprise 4,000 square metres (44,000 sq. ft.) owned by the State and served by railroad tracks, suitable for general merchandise. There are 1,000 square metres (11,000 sq. ft.) of refrigerated space owned by the State, and served by railroads for the use of the fishery industry.

EQUIPMENT, FLOATING.

Grain elevators, 2, capacity 80 tons an hour (2,940 bushels) (1 metric ton 2,204 lbs equals 36.73 bushels of wheat at 60 lbs per bushel), per machine. Floating cranes, 1, capacity 40 tons. Landing pontoons, 15.

RAIL CONNECTIONS.

The railroad service is performed by the State railroads of Rumania, C.F.R. Direction General de Chemin de fer de l'Etat Roumain, to Bessarabia, Moldavia, Bucovina, Transylvania, and Wallachia.

Connections by water on the Danube, on the Pruth, and on the Sereth have been discussed under the head of Danube Traffic. Regions served: Bessarabia, Bucovina, Moldavia, Wallachia and the East of Transylvania for imports, and exports.

DOCKING CHARGES.

Vessels loading or discharging products of the soil: Cereals, coal, or lumber 1 lei for each metric ton of the maximum carrying capacity of the vessel. If the loading is less than one third of the capacity the tax is reduced by one third, if the loading is still less the tax is reduced by two thirds.

A vessel loading and discharging other classes of merchandise 2 lei for each ton of merchandise discharged or loaded.

FRESH WATER.

There is no fixed tariff. The port has no special equipment for provisioning vessels with fresh water.

Respecting bunkers there is no port tax upon coal loaded into bunkers.

QUARANTINE.

For the first quarantine visitation each year 20 lei, for the stamp. The quarantine visitation is gratis. The annual visa is gratis.

CUSTOM HOUSE FEES.

One per cent. on the value of the merchandise loaded at the port; a 20 lei stamp on the bill of lading; an 11.75 lei stamp on the general manifest; a 2.25 lei stamp for partial manifest; a 1.75 lei stamp for declarations; a 1.75 lei stamp on the declarations of ship's stores on board; a 2 lei stamp on the permission to load provisions on board.

PORT WARDEN'S FEE.

For the captain of the port, 2 lei stamp for landing permit. 1 lei stamp for the questionnaire form; a 1.25 lei stamp for clearance papers.

FEES FOR PLANT.

Grain elevators: 53 lei to 72 lei for ton of grain transferred.

Floating cranes: 13,000 lei per day. By the hour 3,000 lei for the first hour, 2,000 lei for the two succeeding hours, 1,500 lei, for the five succeeding hours.

Lighters: 200 lei to 500 lei according to time.

Pilotage: For bringing the vessel into the basin-dock 24 lei per registered ton.

NEW BASIN FOR GENERAL COMMERCE AND LUMBER.

The Administration of the Basinal de Lemnarie is under the Service Hydraulique De l'Etat Roumain.

Quays: 2,750 metres (9,212 ft.) of which 1,470 metres (4,924 ft.) is on the inside of the basin. There are no warehouses and equipment. Floor area of the lumber depots totals 350,000 square metres.

Rental: 252 to 312 lei per square metre per year. Rent 1,080 to 1,200 lei for each front metre per year.

Port Dues: The same as for the main port.

As a winter port: The new basin is employed as a winter port; as a lay-by harbour, during the period of interruption of Danube traffic by ice. The area of the new basin is 90,000 square metres (968,760 sq. ft.) (one square metre equals 10.764 square feet).

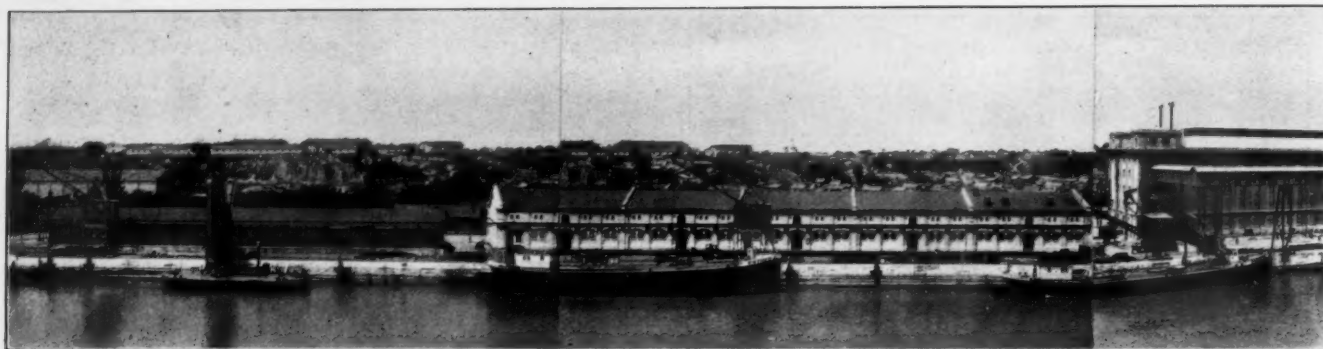
Dues: Steamboats 576 lei for each 100 square metres occupied by the vessel—length by beam equals M². Barges



River Front, Braila, looking downstream from Administration Building.



Bridge Cranes at Braila, crossing Transit Sheds to Single-storied Warehouses at Grain Silo Quay.



Panorama of Basin Dock, Port of Braila, Rumania.

492 lei per square metre, for smaller barges, 288 lei per square metre. The charge for the first 100 square metres is double.

CUSTOMS ENCLOSURES OR BASIN-DOCK.

The Basinal Docurilor is under the Administration of the Docks of Galatz, a government organisation (Service des Docks de Galatz). At Galatz there is no free port zone, but an enclosure in which merchandise may remain two years under the control of Customs officials without paying duty until such time as the merchandise is entered for consumption and removed from the enclosure. This is a bonded warehouse area almost like a full fledged free port.

Quays: 2,100 metres (6,910 ft.) of which 1,450 metres (4,770 ft.) are on the inside of the basin.

Warehouses: 24,000 square metres (258,240 sq. ft.)

Cellars: 2,800 square metres (30,140 sq. ft.) for general merchandise.

Grain elevators: 3,200 square metres (34,450 sq. ft.) with a capacity of 22,000 tons (100,000 bushels).

Loading platforms for lumbering and coal, 37,000 square metres (398,268 sq. ft.)

Equipment: One crane of 40 tons. Rate for use: Variable. One crane of 9 tons; Rates 140 lei an hour. Four cranes of 3 tons, one crane of 2½ tons. Seven cranes of 1½ tons; Rates 120 lei an hour.

Railroad connection: The zone has about 13 kilometres (8 miles) of railroad connecting with the State railroads of Rumania.

RATES FOR SERVICE IN ADDITION TO PORT CHARGES.

Rates for use of grain elevators are as follows: Elevating, 36 lei to 50.20 lei per ton (clearing 36 to 90 lei a ton). Processing to break off the points of the wheat, 90 lei per ton. Use of two travelling loading elevators at dockside for loading grain into vessels, 32 to 46 lei per ton. Two floating elevators for transshipment of cereals in stream (barge-ship), 14.40 to 72 lei per ton. The grain elevator is of bee-hive (hexagonal) silo construction with stone and concrete outer walls. The car dumping, cleaning, elevating and other machinery is similar to American grain elevators. The grain is conveyed by belts through tunnels to shipside towers and sprouts.

Ship-board transfer by floating elevators within the Basin-Dock are subject to a tax of 12 lei per ton. This is to force such traffic into the more roomy Danube.

The rates of trans-shipment through the modern mechanically equipped grain elevators are about one tenth that of the cost of loading grain in sacks by hand, along the river quay, as has been the custom since long before the construction of modern elevator equipment.

DRY DOCKS.

The Port has two floating docks with capacities up to 2,000 tons displacement. The rates are 1,500 to 1,900 lei for lifting plus 750-3,150 lei for time in the dock.

Tow-boats comprise: One of 125 h.p. and one of 250 h.p. Rate for towing 960 and 2,160 lei an hour.

FACILITIES AVAILABLE.

The warehouses operated by the dock are considered general merchandise warehouses and issue "warrants" or warehouse receipts, negotiable at the Banque National de Rumanie and other banks. These warehouse receipts or warrants come under the laws of 1881 governing warehousing.

Merchandise entered in bond may remain in bond in the dock for a period of two years without paying duty. Merchandise deposited in open storage and in the cellars, which space is rented to operators, has the privilege of remaining one year in bond.

Vessels of foreign flags within the port are given identical treatment with those of the Rumanian flag.

THE WINTER HAVEN IN DOCK BASIN.

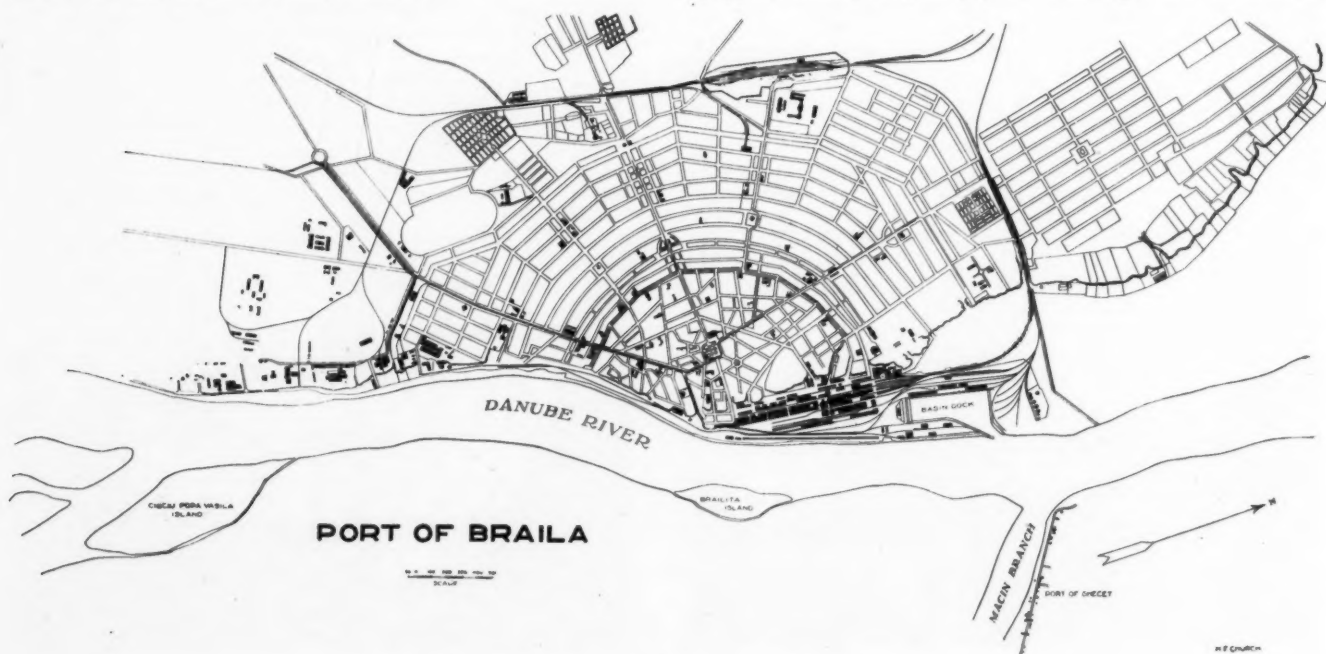
These docks are used during the interruption of navigation by ice as a winter haven. The basin has an area of 80,000 square metres. The charge depends upon the tonnage of the vessel using it. For the use, steam vessels pay 576 lei for every hundred square metres, for barges 432 lei, small boats 288 lei.

The new basin of 90,000 M² area is also used as a winter haven.

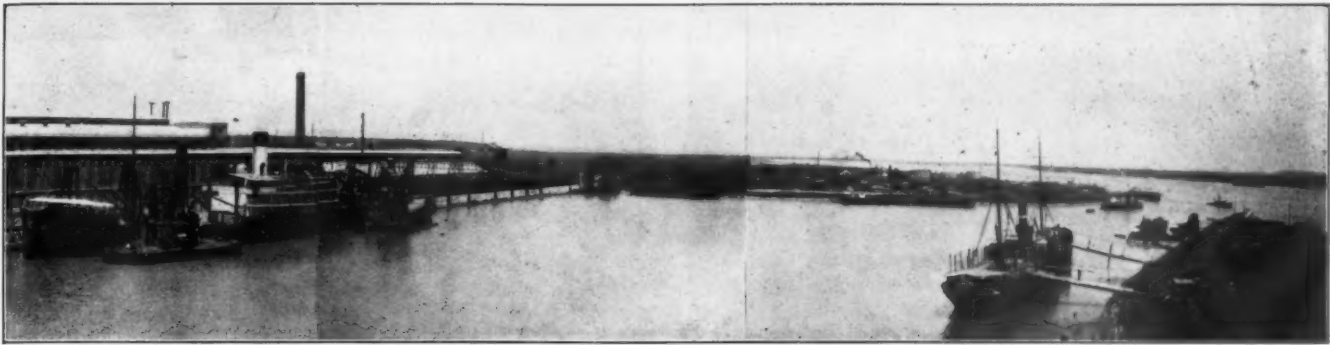
PROJECTS FOR FUTURE EXPANSION.

The most important plan is that of the creation of a free zone, utilizing that portion now occupied by the lumber terminal. This will require the construction of new port facilities, for lumber export, along a stretch of river bank for approximately 12 kilometres, toward the mouth of the Pruth.

In general the Port of Galatz is modern, thoroughly equipped, entirely ship-shape, the buildings are of excellent



Map showing the Lay-out of the Port of Braila, Rumania.



Panorama of Basin Dock, Port of Braila, Rumania.

construction, and pleasing architectural design. It is a thoroughly modern port.

The traffic of the Port of Galatz, river and ocean in 1925 (last statistics available) are as follows:

Tons of Cargo Carried.			
Foreign imports (metric tons)	...	...	102,000
Foreign exports (metric tons)	...	...	762,000
Total			864,000
Foreign and Domestic, River and Ocean.			
Ship movements—	Vessels	Tons of Cargo	
Entered (River)	3,179	168,649	
Entered (Ocean)	665	105,025	
Cleared (River)	3,182	180,058	
Cleared (Ocean)	659	682,189	
Total			1,135,921

In foreign commerce (864,000 tons) the ports of the United States in this class in 1925 are:

				Rank		Long Tons
				1925	1926	1925
*Portland, Oregon	...	...	...	22	14	870,000
Charleston, S.C.	...	...	...	18	15	1,040,000
" (1926)	...	...	...			1,424,600
Seattle, Washington	...	...	...	19	18	974,000
Beaumont, Texas	...	...	...	26	21	732,400
Tampa, Fla.	...	...	...	20	22	949,700
*Savannah, Ga.	...	...	...	21	23	884,877
Galatz	...	...	...			864,000

(*Note similarity of river ports with Portland, Oregon and Savannah, Georgia).

(* Note similarity of river ports with Portland, Oregon and Savannah, Georgia).

In total commerce (1,135,921 tons) the similar commerce of ports in the United States, foreign, coastwise, and intercoastal traffic for 1925 may be mentioned.

	Tons
Charleston, S.C.	2,415,000
New Haven, Conn.	1,260,000
Miami, Fla.	1,171,000
San Louis Obispo, Cal.	1,071,000
Galatz	1,135,921

THE PORT OF BRAILA.

The Port of Braila with a population of about 120,000, on the north bank of the Danube between kilometres 168 and 173 from the Sulina Mouth is an old city. Its plan has the characteristic street arrangement in concentric semi-circles, a

characteristic impressed upon by the Russians. Before the war, Braila was the principal export centre of Rumanian wheat and other grains. The sections between the open public river bank and the town, upstream from the new interior basin portion of the port is occupied by rows of single storied offices of grain merchants. Parallel with these and served by railroad spur lines are long narrow warehouses for the storage of grain in bags. The modern grain elevator is in the new basin. Paralleling the river is a very wide open space at kilometre 170. For generations farmers in their characteristic high yoked carts or sleds, reminiscent of Russia, bring their grain in sacks to this large market. The cartmen also haul the grain from warehouse, sample-room, or railroad. When sold the grain is loaded directly into waiting vessels by man power.

GRAIN HANDLING.

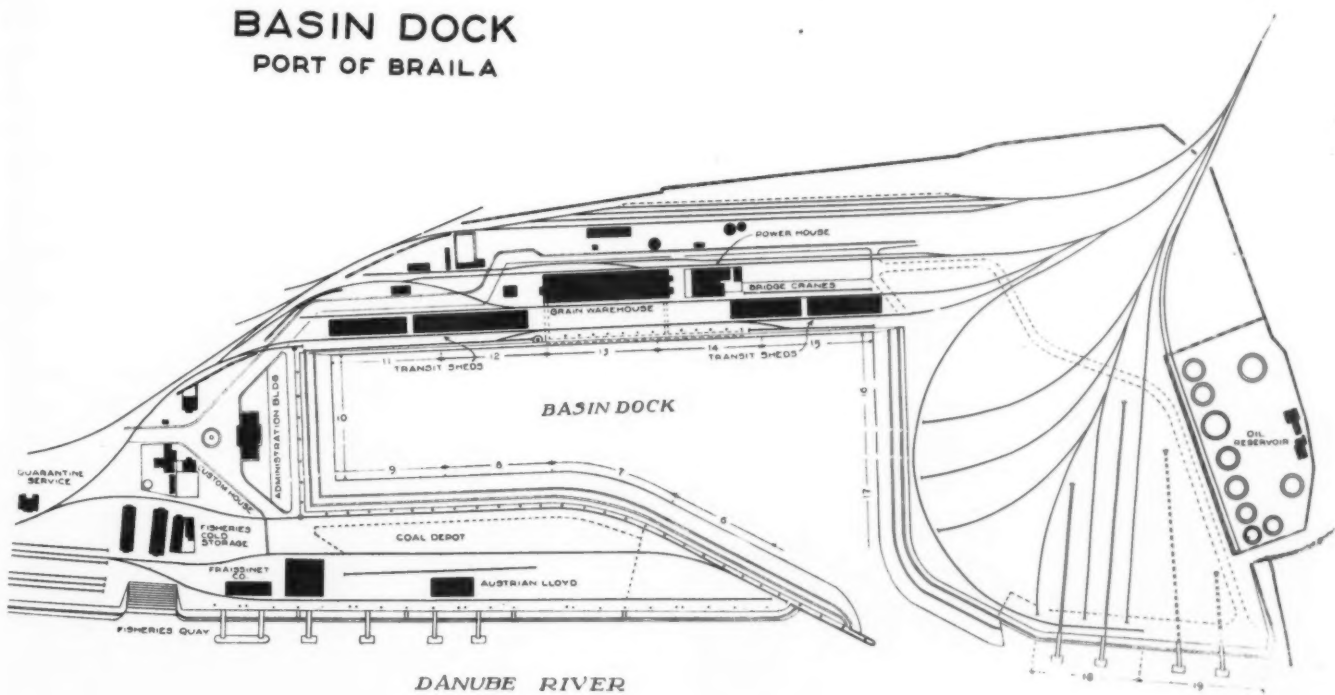
The longshoremen use the sack-over-the-back-of-the-shoulder method, known in the Mississippi River as "steam-boating." A bag of corn weighs 75 kilogrammes (165 lbs.) and a bag of wheat 80 kilogrammes (176 lbs.) The men work in crews of eleven men (accord system) and are paid by the ton. In eight hours a crew will load seven to eight ten-ton carloads, or as many carts as required to make a total of 70 or 80 tons of grain.

Although a floating grain elevator or a dock silo elevator will handle more grain in an hour than a crew of eleven men in a working day, the old system persisted until after the war, when a labour crisis finally developed, hastened by the men themselves. The old system of generations was controlled by the longshoremen, the cartmen and the broker. The longshoremen, who in gangs "steam-boated" the bags aboard the vessel across the long planks going and coming like strings of ants; the cartmen with their small one horse waggons who congregated on cereals platform totalled at least 4,000 men.

Even after the construction of modern silo elevators at the docks a division of the grain movement between hand labour, floating elevator, and silos remained, but ratios were entirely changed as the appended figures show.

	1910	1925
Hand labour	970,000	30,000
Silo elevators	110,000	25,000
Floating elevators	745,000	870,000

BASIN DOCK
PORT OF BRAILA



DANUBE RIVER

Map showing the Lay-out of the Basin Dock at Braila.



Merchandise Quay, Basin Dock, Braila.

The shift in 1925 is very startling. Also, note well, the question is between the two shore methods handling grain arriving at the port on wheels, either carts or railroad "wagons," while the floating equipment simply transships between barge and ocean vessel at some convenient anchorage in stream.

So the 4,000 grain bag handlers are suffering abject poverty. They were a proud and arrogant organization spoiled by having had their own way for years when the traffic would bear it. But the grain exports sank to a fraction of the former figure cutting the demand for their labour. The lei sank in value and purchasing power. Its foreign exchange value, not the same thing as its local purchasing power, yet close enough to give some idea, sank from five to the dollar to 200 to the dollar. On a basis of a decline to one fortieth of its former value, a wage was demanded nominally one hundred times the pre-war rate, or $2\frac{1}{2}$ times as much as measured in the actual foreign exchange value of the currency.

The longshoremen and cartmen did not kill the goose because the goose was dying of old age anyway, but they hastened its demise in the face of modern grain handling machinery. There was hardly enough cart and muscle-handling going on in 1927 to get photographs of it. The wane light itself is characteristic of the passing of what for years was one of the most picturesque and unusual scenes in Europe, a passing, as is usually the case in large economic transitions, accompanied by much suffering among those concerned.

HINTERLAND.

The State Railroad (C.E.F.) serves the same hinterland areas as in the case of the Port of Galatz. On the Danube are essentially the same barge and steamboat services as from Galatz. The port serves as the gateway of imports for Transylvania and Wallachia, especially Transylvania, and for exports from Bessarabia, Bucovina, Bulgaria and a region of Transylvania. Also it is the gateway for grain from Wallachia, and all the River Danube ports above, including those of Serbia and Bulgaria.

The port is comprised of six distinct sections; (1) The main port, or the old port along the river bank with the famous cereal or grain platform just mentioned; (2) The entrance dock or winter port; (3) The small port of refuge at Ghecet, the right angled branch, Macin, of the Danube at kilometre 109; (4) The river banks approachable for vessels where it is planned to construct a free port; (5) The industrial quarter.

THE MAIN PORT.

The main port is under the administration of Le Service Hydraulique de l'Etat, of the State. It extends along the Danube for 2,300 metres with revetments and 1,850 metres of natural river bank, or a total of 4,150 metres.



Loading Grain by Hand up the Catwalk, Port of Braila.



Vessel at Cereals Platform, Braila, loading Grain in bags by Hand.

Transit sheds and warehouses comprise 1,576 square metres owned by the Ministry of Communications of the State for general merchandise. There are transit sheds and warehouses connected by ten and one-half kilometres of railway track. Also, there are 70,850 kilometres of tracks used primarily for grain in bags and general merchandise.

There are thirty-two grain elevators, with a capacity of 80 to 160 tons an hour each. Floating cranes; one of 40 tons capacity belongs to the S.R.D. Company. Landing pontoons; 15.

PORT CHARGES.

Fresh water: Sixty lei a cubic metre, to the Service Hydraulique and 10 lei per cubic metre to the city of Braila, a total of 70 lei per cubic metre.

Bunkers: There are no taxes on bunkers at the port.

Customs Fees: The same as for Galatz.

Fees for the Captain of the Port: The same as for Galatz.

THE INTERIOR BASIN-DOCK.

The administration of the basin is under the Service of the Docks of Braila, a subsidiary of the State organization.

There is no free trade zone or free port at Braila at the present time, but merchandise may remain under customs supervision without the payment of duty until the goods leave the warehouses and are entered for consumption.

The quays of the basin have a length of 2,288 metres of which 1,544 metres are in the interior of the basin. The transit sheds and warehouses have an area of 8,050 square metres for general merchandise.

The petroleum products reservoirs cover an area of 4,000 square metres.

The grain elevator covers an area of 3,200 square metres with a capacity of 25,000 tons.

Platforms for lumber depot and for coal have an area of 4,600 square metres.

The port equipment consists of one crane of five tons with a coal grapple at a fee of 260 lei an hour. One crane of nine tons at 144 lei an hour. Two cranes of three tons, and two cranes at $2\frac{1}{2}$ tons at 120 lei an hour.

RAILROAD CONNECTIONS.

The docks possess $9\frac{1}{2}$ kilometres of railroads connecting with the State railroad, C.F.R. The connections of this port to the hinterland are the same as for the main port. The same applies to the water connections with the rest of the hinterland. The territory served is practically the same with considerable transit trade with Serbia and Bulgaria.

Dock fees in addition to the harbour dues for the use of the grain elevators, cleaning grain, pointing grain and the use of the grain elevators are the same as Galatz.



Loading Grain by Hand from Cart, Braila.

Harbour Engineering Notes.

The warehouses are under the direction of the State and warehouse receipts are accepted by the Banque Nationale de Rumanie and other banks. The conditions periods of free time in cellars and open storage are the same as at Galatz.

The winter port of the dock station has an area of 85,000 square metres and serves as a port of refuge in periods of ice.

GHECET.

The branch of the Danube below Braila called the Macin, directly to the right serves as the principal winter port of refuge of barges and tow-boats in Danube navigation. This branch is four kilometres long and has a capacity of accommodating three rows of barges tied up to the left bank. During the months of January and February this stretch of quiet water free from ice jams and heavy current is one solid mass of Danube barges. The charges for the use of this winter port are; steam vessels, 576 lei for every 100 square metres, for barges 432 lei, and for small boats, 288 lei per 100 square metres.

The nature of the equipment, the administration building transit shed, grain and general layout of the ports of Braila and Galatz are readily discernible from the maps and the photographs. It is perfectly evident that these ports are fully equipped for the business they are to handle. It is also evident that the architects have done their share of good work in designing buildings, warehouses, and elevators in a pleasing architectural effect. These two trans-shipment ports of the lower Danube are alert in preparation to function in a modern manner, with all necessary equipment for the present and ample plans for the future as commerce increases.

THE COMMERCE OF THE PORT OF BRAILA.

The commerce of the Port of Braila in 1925 was:

Foreign (in tons of cargo):—				
Imports (metric tons)	...	...	...	73,195
Exports (metric tons)	...	...	...	537,600
			Foreign total	610,795
Ship movements—		Vessels	Tons of Cargo	
Entered (River)	...	6,112	1,010,611	
Entered (Ocean)	...	464	67,376	
Cleared (River)	...	5,945	239,701	
Cleared (Ocean)	...	463	950,038	
			Total commerce (tons of cargo)	2,267,726

For purposes of comparison, ports of the United States showing similar totals of foreign, coastwise, and intercoastal tonnage in 1925 comprise:

Atlantic—			
Braila	...	...	2,267,726
Portland, Maine	...	...	2,544,000
Charleston, S.C.	...	...	2,415,000
Jacksonville, Fla.	...	...	2,345,000
Savannah, Ga.	...	...	2,048,000
Gulf—			
Tampa, Fla.	...	...	2,909,000
Mobile, Ala.	...	...	2,044,000
Sabine, Texas	...	...	1,571,000
Pacific—			
Tacoma, Wash.	...	...	3,634,000
Everette, Wash.	...	...	1,659,000

(To be continued).

Port Dues in Yugoslavia.

Prevailing Rates of Exchange.

The Department of Overseas Trade has received from the Commercial Secretary at Belgrade the following official rates of exchange for the payment of port dues during February which appeared in the "Official Gazette" of 26th January:—

	Dinars.
1 Gold napoleon	218.65
1 Pound sterling	277.00
1 American dollar	56.75
1 Canadian dollar	56.45
1 German mark, gold	13.53
1 Polish zloty	6.35
1 Belga	7.92
100 French francs	223.30
100 Italian liras	300.00
100 Dutch florins	2290.00
100 Rumanian leis	35.00
100 Danish crowns	1520.00
100 Swedish crowns	1524.00
100 Norwegian crowns	1510.00
100 Spanish pesetas	927.00
100 Greek drachmas	75.65

Personal enquiries regarding shipping and transport matters should be made at the City Office of the Department (Shipping and Transport Section), 73, Basinghall Street, London, E.C.2.

NEW WELDING TRANSFORMER.

For some time efforts have been directed by designers of electric welding plant to evolve plant which will give an improved power factor with a balanced load on the supply mains, and these difficulties have been met by the designing of a new single welder unit known as the "Quasi-Arc Compensated Rotary Transformer," which has just been placed on the market. This apparatus consists essentially of a rotating transformer capable of giving a 60/30 volt alternating current drooping characteristic similar in shape to that of the well known d.c. generators. Thus, although employing alternating current it is possible to weld with only 30 volts at 200 amperes, the welding conditions being perfect for all classes of welding. In operation, the driving motor and primary windings of the rotary transformer are directly connected to the supply mains through a controlling starter, the welding circuit being connected to the secondary windings of the rotary. While the motor is stationary, therefore, the rotary transformer constitutes a static transformer, but as soon as the motor starts up, the primary windings rotate inside the secondary, inducing in them a current the frequency of which varies as the speed of rotation. In this way, it is found possible to synchronise the single phase pulsations in the welding circuit so that the same amount of current is drawn from each of the supply lines whatever the number of phases.

PROGRESS IN MOTOR SHIP BUILDING.

Since the placing of the M.V. Aorangi into commission in January, 1925, increased attention is being paid to the use of the two-cycle Diesel marine engine for ship propulsion, and the number of large vessels so equipped is steadily growing. The Aorangi has established a remarkable record, in that, to date, she has covered upwards of 300,000 miles and has never once been a minute behind her schedule. She was constructed by the Fairfield Shipbuilding and Engineering Co., Ltd., and is fitted with Fairfield-Sulzer engines of 13,000 total h.p. Several large passenger ships similarly equipped have since been placed in commission and are shortly to undertake their maiden voyages. One of these is the Sibajak, which vessel was built for the Rotterdam Lloyd, and is fitted with Schelde-Sulzer engines of 10,000 b.h.p. In this connection the partiality of Dutch shipowners for motor vessels is noteworthy. The Rotterdam Lloyd has in service now five motorships aggregating 61,800 tons and 28,800 b.h.p. Sulzer two-cycle engines, and the Netherlands Steamship Company has three vessels aggregating 56,500 tons and 23,200 b.h.p.; furthermore, four single-screw cargo vessels of 7,040 b.h.p. each, and one of 5,500 b.h.p., are under construction. The former line has recently ordered two passenger vessels of 14,000 b.h.p. each, and the latter two twin-screw passenger motorships of the same b.h.p.

DOUBLE SQUIRREL-CAGE INDUCTION MOTORS.

Squirrel-cage induction motors are simpler and more robust in construction, require simpler starting apparatus, and cost less than slip-ring motors, though their use in the past has been restricted to those applications requiring a comparatively low starting torque. The reason for this is that although an ordinary squirrel cage-motor capable of exerting a high starting torque can be designed by increasing the resistance of the rotor winding, the effect of such an increase will also be to decrease the operating efficiency of the motor. In the case of the slip-ring motor this difficulty has been overcome by inserting a temporary resistance in the rotor circuit during starting and short-circuiting in the rotor circuit during starting and short-circuiting it afterwards. By this means good starting torque and high efficiency characteristics are obtained.

It has now been found possible to construct a particular type of squirrel-cage motor having these same characteristics. This motor thus has all the advantages due to the simplicity of the squirrel-cage motor, and in addition, is capable of exerting a large starting torque with a comparatively low starting current and of working with high efficiency on both continuous and intermittent service.

In outward appearance and general mechanical construction the double squirrel-cage motor is similar to the ordinary squirrel-cage motor, and the same simple starting apparatus is employed. The only difference is in the rotor, which has two definite squirrel-cage windings. The outer winding nearest the air gap is of high resistance and low reactance, while the inner winding, nearest the shaft, is of low resistance and high reactance. The combined effect of these two windings gives the motor a high starting torque characteristic without excessive starting current, and also enables it to work at high efficiency, the reason for this being as follows:—

The current in each of the rotor windings is limited by the impedance of that winding, and since the reaction of the individual windings varies directly with the frequency, it follows that the currents in the two windings when starting—the rotor flux at this stage being at the supply frequency—will be limited mainly by the high resistance in the case of the outer winding

and the high reactance in the case of the inner winding. As the motor speeds up, the frequency of the rotor flux decreases proportionately, so that at full speed the reactance of the inner winding becomes negligible, thus allowing a much larger proportion of the rotor current to be carried by this winding. The result is that, whilst at starting the larger proportion of the rotor current is carried by the outer squirrel-cage winding, which has a high resistance, and therefore enables a large starting torque to be exerted without excessive starting current, at full speed the inner winding which has a low resistance carries most of the rotor current, and therefore enables the motor to work at high efficiency.

Double squirrel-cage induction motors will exert starting torque and take starting currents as follows, depending upon the actual method employed for starting: Motor thrown direct on the line—starting torque not less than twice full load torque (synchronous); starting current not more than four to four-and-a-half times full load current. Using an auto-transformer starter with 70 per cent. tap—starting torque approximately equal to full load torque. Starting current approximately equal to twice full load current. Using a Y-Delta switch—starting torque approximately equal to two-thirds full load torque. Starting current equal to one and one-third full load current.

The torque at starting when the motor is thrown direct on to the line is, as mentioned above, equal to about twice full load torque, and the maximum running torque is generally slightly smaller than the starting torque. Consequently, the double squirrel-cage motor, if overloaded, is not so likely to drop out of step as the ordinary squirrel-cage motor, because if the maximum running torque is exceeded, but the starting torque not exceeded, the motor will slow down until a stable part of the slip torque curve is again reached.

The percentage slip of the double squirrel-cage motor is practically the same as that of the ordinary squirrel-cage motor.

The new motor should be considered for constant speed applications where high starting torque, low starting current or simplified control are desired. In the case of a large number of applications, the starting characteristic of the motor will enable it to be thrown on the line using only a stator oil circuit breaker. Where it is necessary, however, to reduce the starting current, and provided a sufficient starting torque can be obtained, either a Y-Delta switch or an auto-transformer starter should be used.

The motor referred to is made by the British Thomson-Houston Company, Limited.

Recent Legal Decisions.

It was laid down in the case of *Steel and Bennie v. United States Emergency Fleet Corporation*, 1928, Sh. Crt. Rep. (Sc.) 46, that it was the duty of a ship in harbour to have its anchor sufficiently submerged as to be clear of any size of craft passing, and the owners of a moored ship were held liable to owners of a small vessel, which was pierced by the fluke of insufficiently submerged anchor.

The facts briefly were that the "Clairton" was lying moored at berth No. 19 in the Princes Dock, in the harbour of Glasgow, and had her port anchor lowered some distance from the hawse pipe; other vessels occupied berths in the dock. One of these was the steamship "Baron Dalmeny," which occupied berth No. 1; her owners desired her to be shifted to berth No. 24, and for this purpose they hired from pursuers the service of two steam tugs, the "Thunderer" and the "Victor." Under the direction of a compulsory pilot, who was on board the "Baron Dalmeny," the operation of shifting that vessel proceeded, the "Victor" being the fore tug and the "Thunderer" the stern tug. In the course of the operations the "Victor," whilst passing the "Clairton," was struck about her water line by the fluke of the "Clairton's" anchor, which pierced the hull of the "Victor" and caused her to sink.

Two questions of interest to our readers which were discussed in the case may be noted. First, it was contended by the defence that in accordance with the well-known collision rule, when a moving vessel runs into a stationary one, there is a presumption of fault on the part of the moving vessel, and that the onus is on her to absolve herself from blame. The evidence in the case, however, established that there was no collision such as is anticipated by that rule. It was not a case of a moving vessel running into a stationary one. As the Judge said: "The overwhelming balance of credible testimony in the present case satisfies me that the anchor of the 'Clairton' was not sufficiently immersed to enable a small vessel like the 'Victor' to pass the side of the 'Clairton' in safety, and that the fluke of the anchor pierced the hull of the 'Victor' about her water line."

The second line of argument by defendants was that, assuming the fact to be established that the hull of the "Victor" was pierced by the fluke of the "Clairton's" anchor, that fact should not be held as inferring liability for damages against the owners of the "Clairton," because the anchor had been placed where it was, was not the doing of those in charge of the

"Clairton," but was the doing of the harbour officials. Even if the anchor had been placed as it was under the direction of a harbour master, the Court were unable to see how that affected the question as between pursuers and defenders, whatever the effect might be in a question of relief between defenders and the harbour authority, for on the Clyde, there is no anchor direction at all, as some of the cases indicate there is on the Thames. The Clyde bye-laws say not a single word about where an anchor is to be placed, so that such cases as "The Margaret," 1881, L.R., 6 P. 76, or "The Monte Rosa," 1884, 9 A.C. 873, which turned upon failure to observe a bye-law, were held not applicable to the present case. Article 64 of the Clyde Trust Regulations, founded on by defenders, refers only to the berthing of vessels, and says nothing about the treatment of anchors.

Various suggestions of fault were made which, though they did not receive very serious consideration from the Court, are yet of practical interest, particularly in regard to the manipulation of vessels in narrow harbour waters. (a) The suggestion was made that the "Victor" should never have been going down close to the "Clairton" at all, but there was evidence to the effect—and even apart from evidence it seems pretty obvious—that a tug manoeuvring in a crowded dock, in a narrow space of 120 ft., must necessarily often have to go very close to ships moored at the quays, and there was nothing in the evidence to suggest that the "Victor" was doing anything unusual, or anything dangerous, and she was entitled to assume that ships lying at a quay would have their anchors sufficiently submerged to be out of the way of passing vessels. (b) It was suggested also that the "Victor" should have cast off her tow rope, but there is nothing in the evidence to suggest that there was any occasion for that. Her business was to keep up the "Baron Dalmeny's" head, and she was under the direction of the pilot of the "Baron Dalmeny," who would have had something pretty strong to say to a tugmaster who slipped his cable without the pilot's orders. It was not suggested that the pilot gave such an order, and no circumstances were disclosed which seemed to suggest that the "Victor" was in any danger by sticking to her tow, or which necessitated the "Victor" taking any emergency action on her own account. And (c) it was suggested also that the "Victor" would have never had occasion to come near the "Clairton" but for her own action earlier, in preventing a rope being put ashore, by getting in the way of the boat which was in attendance to take a rope from the "Baron Dalmeny" to the south quay; but, in the weather conditions as described in the meteorological officer's report, it could not, the Court thought, be suggested that the "Victor" was in fault in being where she was at the time the boatmen made their futile attempt to land the rope. Failure to land a rope is a not uncommon occurrence, and, in the weather conditions, and in the state of the dock, the failure to land the rope did not infer fault upon the part of the master of the "Victor," or of anybody else.

For all concerned in any way with the carriage or storage of oil, the case of *De Monchy and Others v. The Phoenix Insurance Company* is important. It turned on the construction of a clause in an insurance policy undertaking "to pay leakage from any cause in excess of 1 per cent. on each invoice . . . conversion of kilograms into American gallons shall be made on the basis of 3.25 kilograms to the gallon." The plaintiffs had shipped on the "Cape Town Marue," at Jacksonville, 100 barrels of turpentine for carriage to Rotterdam. During the voyage the steamer met with heavy weather, and when the turpentine was discharged at Rotterdam it was alleged that 372.75 kilograms out of a total of 16,597.75 kilograms shipped had disappeared. As turpentine was a volatile substance and expanded when heated, the weight of a gallon would depend on the actual temperature at the moment, and a conventional weight per gallon was, therefore, agreed on. Up to a loss of 1 per cent. no claim could be made, but where there was a greater loss the underwriters had been in the habit of paying on the basis of the conventional weight, taking the difference between the weight shipped and the weight delivered as the amount of the loss. But the underwriters in this case had taken up the attitude that they would not pay for leakage unless there was visible injury to the barrels or other clear signs of leakage.

Mr. Justice McKinnon, in giving judgment, stated the facts, and said that the first defence to the claim was that the insurance was only against leakage, and though, if the temperature fell, the contents of a barrel might occupy less space without any of the contents being lost, for such loss of bulk the underwriters would not be liable. The defence contended that "leakage" must be construed strictly, and that the word was only applicable where something which had been in a receptacle had accidentally got out of it and had been lost. But, reading the clauses of the contract as a whole, he thought that what the underwriters said was: "We will pay for any loss of weight or of bulk during this voyage if the loss exceeds 1 per cent." The plaintiffs were, therefore, entitled to find the arrival weight, turn the quantity shipped into gallons by the conventional formula, and then, if the difference between those two weights exceeded 1 per cent., make a claim. On that part of the case, therefore, the claim succeeded.

Port of Southampton Topics.

TWO BIG CONTRACTS.

Since the beginning of this year, developments in connection with Southampton's dock extension scheme have been rapid. A week or so ago the Southern Railway placed two contracts for the laying of two miles of culverts, seven feet in diameter, under the tidal mudlands on the western shore which will be used for storm water drainage and the supply and discharge of sea water to the Corporation Electricity Station and the Corporation Baths, in front of which the new docks will eventually extend. The contracts were secured by Messrs. Charles Brand and Son, of Wood Street, Westminster, and Messrs Sharp, Jones and Company, Limited, of Parkstone, Dorset. The former firm will construct the culverts and the latter will supply the reinforced concrete lining to be used in connection with them. Work will be begun as soon as the contractors have assembled the necessary plant on land adjacent to the site and is expected to take about 18 months to complete.

In view of the fact that the culverts are to be laid under tidal mudlands the operation is of great engineering interest. They will be built in a large trench so constructed that its sides—probably of interlocked steel sheet piling—will be extended upwards several feet above high water level of spring tides so as to exclude tidal water. At the present time there are a number of storm water drains around the foreshore discharging on to the mudlands, which are to be reclaimed. These drains will be gathered up into one large culvert which will pass right across the mudlands to discharge outside the new embankment on the southern limit of the area to be reclaimed. Under normal conditions water will discharge through this culvert under gravity, but, in order to deal with large quantities during a severe storm on unusually high tide, a pumping system, equipped with powerful electric pumping apparatus will be built at the seaward end of the culvert near the new quay wall.

The storm water culvert will begin at a point near the West Station and carried around the present foreshore to the Electricity Station, where it will be joined by two other culverts which are to provide and discharge the water for condensing purposes at the Electricity Station. All three culverts will be superposed in one large trench continuing across the mudlands to the sea wall. The culverts to serve the Electricity Station have been designed to carry 4,500,000 gallons per hour and by an arrangement of valves near the Electricity Station it will be possible for either of the two condensing water culverts to be used alternatively for the supply and discharge of water and also for the storm water culvert to be used as an emergency discharge for condensing water. The culverts will be formed with pre-cast reinforced concrete pipe linings, laid and joined with cement and surrounded by mass concrete. The materials to be used in the contracts will include about 50,000 tons of gravel for concrete and 7,000 tons of Portland cement.

PLANS AND PROGRESS.

The Southern Railway Company have already begun the construction of the 3,500 ft. deep-water quay wall which will be sufficient for the accommodation of four large vessels of the type now using the port. Later on they will add to the accommodation, for the scheme will eventually provide for the berthing of 20 of these vessels. The wall is to be 90 ft. from foundation to coping.

The dredging in connection with the scheme entails the removal of something like ten million tons of earth. Already over a million and a half tons of this amount have been removed, the work having been carried out by the James Dredging Company. A big proportion of the dredged material will have to be dumped at sea in specified areas, but a great deal will be used to reclaim the mudlands behind the new quay wall. This is the first time that dredged material has been used for reclamation work at Southampton, such work having previously been done with imported materials, brought to the town at big expense. The reclamation work will give an added area of 185 acres to Southampton and this eventually will be extended to about 360 acres. Of the 185 acres, 102 will be handed over to the town to be utilized in the manner thought best.

FOR OTHER HARBOURS.

An order in connection with a hauling-up slipway for service at Kigoma in Central Africa, has been received by Messrs. Day, Summers and Company. The instructions received from the Crown Agents for the Colonies, involved the partial reconstruction and completion of a slipway plant which was begun by the Germans before the war.

Meanwhile the work of erecting the slipway constructed by the firm last autumn for the new harbour at Takoradi on the Gold Coast is proceeding satisfactorily. Messrs. Day, Summers and Company sent out one of their own engineers to superintend the work and a report has been received that the erection of

the machinery is complete and that the cradle is also well in hand. It is hoped that the slipway will be completed and ready for use at the end of March.

The hauling up cradle is of a special double design for dealing with vessels up to 650 tons dead weight and the machinery is driven by a 350 b.h.p. motor. The firm, which as long ago as 1862 patented their traversing tripod sheers, claim to have the longest record for slipway and sheer-leg machinery in the Empire. One of their slipways at their own works at Northam has been in use for 52 years.

HARBOUR BOARD TOPICS.

The Southern Railway Company recently wrote to the Harbour Board pointing out that the time had arrived when the whole of the present swinging ground should be cleared up and that the Company were about to begin work in connection with that portion for which they themselves were responsible. The dredging of the new approach channel to the Docks Extension is just beginning and, in view of this, the Board decided to begin the clearing of the swinging ground as soon as possible.

The Company were, at the same meeting of the Board, granted permission to lay a temporary rail connection between the Board's tramway near the Royal Pier and the lands to the west of the Pier which are being reclaimed. The rails will be checked throughout and sunk level with the surface of the road and they will be removed when no longer required. It is thought that when the new docks are complete this temporary line will be replaced by the permanent rail to link up with the lines serving the present docks. The docks will also be approached by a railway, now being constructed, from the western side. This line will be carried along an embankment and will leave the main line at Hillbrook.

SHIPYARD DAMAGE.

Fire wrought damage to the extent of several thousands of pounds at the Woolston works, of Messrs. J. I. Thornycroft and Company, where a big destroyer building programme is being carried out. The fire was confined to the joinery shop and from the time it was discovered in the early hours of the morning until it was extinguished entry to the building for salvage was impossible. Work in all stages of development was destroyed as well as a large quantity of machinery. The outer brick wall of the building collapsed across the roadway and about 300 tons of bricks were thrown in all directions. The cause of the fire is still unknown.

NEW STEAM OIL TANKER.

It is announced that Sir W. G. Armstrong, Whitworth and Co., Ltd., have secured an order for a steam driven oil tanker for the Vacuum Oil Company Ltd.

The vessel will be 385 ft. in length and is designed to carry 7,250 tons deadweight, on a draft of 24 ft. 4 in.

The propelling machinery will be of the Triple Expansion Type, and will be built by the Marine Engine Department of Sir W. G. Armstrong, Whitworth and Co., Ltd.

The vessel will be laid down immediately at the Walker Shipyard, and is expected to be completed within ten months.

This is the 157th oil tanker to be built by Sir W. G. Armstrong, Whitworth and Co., Ltd.

AUSTRALIAN HIGH COMMISSIONER AT LIVERPOOL.

Major-General The Hon. Sir Granville de Laune Ryrie, K.C.M.G., C.B., V.D., the High Commissioner for Australia visited Liverpool on the 9th and 10th February. On arrival in Liverpool Sir Granville proceeded to the Labour Exchange to interview certain emigrants. In the evening he attended a dinner at the Adelphi Hotel as the guest of the Liverpool Engineering Society.

On the morning of the 10th Sir Granville visited the Liverpool Cathedral and afterwards was the guest of the Liverpool Chamber of Commerce and the Royal Colonial Institute (Liverpool Branch) at a luncheon at which Lt.-Col. Albert Buckley, J.P., D.S.O., presided. Later Sir Granville delivered a brief address on "Anglo-Australian Trade." Representatives of the leading Australian interests in the City attended, including the Chairman and General Manager of the Mersey Docks and Harbour Board. The afternoon programme included a visit to the docks.

Sir Granville had expressed a keen desire to be shown the new Gladstone Docks and he was much impressed with the facilities provided for enabling the largest type of vessel to enter these docks at practically any time of the day or night. He also showed keen interest in the large electric quay and roadside cranes which have been provided at the treble storey sheds erected on the quay side of the new docks for the handling and storage of cargo and also the rail facilities with which these sheds are equipped.

He was accompanied on his inspection by Mr. A. B. Cauty, of the White Star Line and the General Manager and principal officials of the Dock Board. On returning from the inspection of the docks, Sir Granville and party took tea at the Dock Office.

British Electrical Development in 1927.

Influence of the "Grid."

By C. H. S. TUPHOLME.

The influence of the projected "grid" scheme of electrical supply for this country is reflected in the progress made by the leading British electrical engineering firms during the past year in evolving special apparatus required when electrification and linking up of power generating stations becomes general. Quite apart from the designing of apparatus for the public supply of electricity, several developments of interest have been made which will be of interest to harbour engineers running their own supply stations.

It is obvious that the rating of turbo-generators is tending to increase in this as in other countries, and in anticipation of such an increase the British Thomson-Houston Co. has during the past year laid out designs for units up to 100,000 K.W., while several units upwards of 20,000 K.W. have been installed by that firm during 1927. Similarly, Metropolitan-Vickers have been engaged in building units of 45,000, 41,000 and 35,000 K.W. The English Electric Company, too, continue to enjoy considerable success with their impulse-reaction turbine, and several units of 10,000 and 15,000 K.W. have been installed during 1927. The General Electric Company are now building two 37,500 K.W. turbo-alternators. Several large sets are in course of construction at the Witton works of the latter firm, including two of 12,500 K.V.A. for Portsmouth and one 12,500 K.V.A. for Southampton.

The British Thomson-Houston Company has made considerable progress in compound filled switchgear of large rupturing capacities up to 500,000 K.V.A. and for voltages ranging from 6,600 to 33,000.

OIL CIRCUIT BREAKERS.

An order is being carried out now by the above firm for an extensive Indian Railway electrification scheme incorporating the complete equipment for a large number of sub-stations. The 110,000 volt switchgear in these sub-stations comprises massive circular tank oil circuit breakers having a rupture of 750,000 K.V.A. and "carriage type" isolating switches. For high voltage work the carriage type of isolating switch combines the maximum number of mechanical and electrical advantages. A further development of the same contract embodies 1,500 volt d.c. truck equipments fitted with 2,000 amp. and 4,000 amp. high speed circuit breakers.

A further large order covers the complete E.H.T. and L.T. switchgear for a super power station, this contract incorporating about 50 of the well-known B.T.H. type "H" 22,000 volt motor-operated oil circuit breakers of 1,000,000 K.V.A. rupturing capacity.

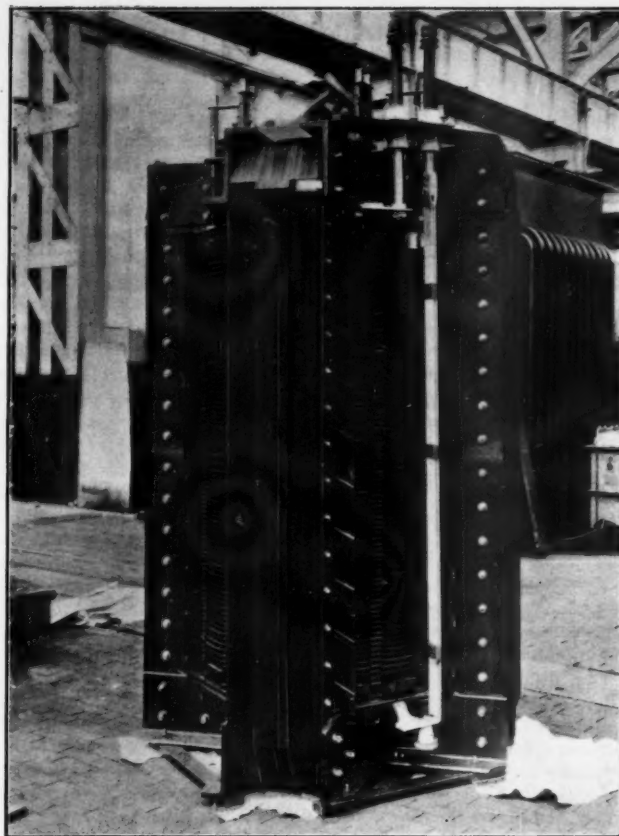
A new form of isolated phase switchgear has been developed, the isolating switches on this lay-out being of the carriage type, electrically operated, so that the access to the gear is only necessary for maintenance work. The switchgear is contained in a separate building and a concrete room is provided for the oil circuit breaker and potential transformer tanks, so that in the unlikely event of an oil fire the free oil and fumes cannot obtain access to live metal, the room being fitted with a gravel catch pit to prevent combustion, and a drainage system is arranged to carry away the oil. This lay-out is equally suitable for outdoor duty if it is desired to save the cost of the containing building.

The progressive development of truck type switchboard in this country is indicated in the design of a switchboard which has been supplied by the B.T.H. for use in this country, the oil circuit breakers having a rupturing capacity of 250,000 K.V.A. and being suitable for 11,000 volts working pressure. Among other distinctive points, a feature of this design is that the busbars and the connections are totally enclosed with insulating tubing, although the standard air clearances for 11,000 volts working is maintained.

A range of potential transformers is being evolved in which the limiting resistance is incorporated as part of the transformer, either in the bushing or under oil, and for the high voltages the fuse is also mounted in the transformer tank.

It is of interest to note that cellulose enamelled sheet control panels are not advocated by the B.T.H. for all new work, and for duty where steel is not suitable Sindanyo (ebony asbestos) is supplied in place of black enamelled slate or marble.

Considerable progress has been made in the field of protective relays, both in the improvement of existing forms of relays and in the development of new types and methods of using them. Under the first heading should be mentioned the development of the new Metrovick low energy type of the definite minimum inverse time overload relay which has been modified to permit lower settings to be maintained when this relay is employed in conjunction with bushing type current transformers, particularly on high tension lines where the line currents are of a very small value.



Core and Coils for one of the B.T.H. 8550 K.V.A. Single-phase Transformers.

TRANSLAY PROTECTION.

Amongst the new developments one of the most interesting is that of a new system of protection called the "translay." This method of protection is applicable to many types of apparatus and to feeders. Although it is a pilot wire system of relay protection, it is capable of working through pilot wires of very high resistance, and is unique in that the relays will not operate with any capacity current which may flow through the capacity of the pilot cable. At the same time it is possible to obtain settings which are substantially lower than can be obtained with other forms of pilot wire protection.

Considerable interest is now being taken in various forms of converting plant, particularly in mercury arc rectifiers, which are being installed on an increasing scale, for instance, by British Brown-Boveri, and some very interesting problems have occurred from time to time in connection with the design of automatic switchgear for use with mercury arc rectification. In some cases very dependable and very sensitive voltage regulation is essential, and, after some considerable research and experiment, the Igranic Electric Company have evolved a relay which is guaranteed to have a sensitivity of less than 0.5 per cent. mechanically and electrically and has neither pivot nor springs.

TRANSFORMER UNITS.

The largest self-cooled transformer units which have been built in this country were installed last year by the B.T.H. Company. These transformers will be tied in banks of three, without intervening switchgear, to 6,600 volt generators, each bank delivering 23,475 K.V.A. at 0.8 power factor to 33,000 volt busbars. The winding arrangement adopted in this case is concentric and the coils are circular, with every conductor in contact with the oil and supported by radial spacers, which ensure adequate support against mechanical forces without heat blanketing. These radial spacers embody the special B.T.H. feature of being dovetailed with axial spacers so that they are definitely locked in position in all directions independently of coil pressure or varnish cementing treatment.

An interesting example of B.T.H. transformer work is afforded by the 6,000 K.V.A. three-phase three-winding transformer for connection to a 84,000 volt line and feeding two secondary networks at 42,000 and 21,000 volts, the design being such that the full output can be obtained at either secondary voltage. Further interesting examples of transformers built during the year are those for feeding large capacity rotary converters at low voltage and heavy secondary current. Among these may be mentioned two 3,300 K.V.A. transformers giving 3,400 amps. for 3,000 K.W. rotary converters, and a 3,950 K.V.A. transformer giving 3,560 amps. for a 3,000 K.W. rotary converter for Buenos Aires.

SHIP EQUIPMENT.

A contract of some interest is that secured by the G.E.C. during the year for the electrical equipment of the M.V.

Bermuda, one of the most luxurious ships ever launched in this country, which has just been completed by Messrs. Workman, Clark and Company, Belfast. On this ship there is an electricity generating plant, main and emergency switchboards, 150 motors totalling 2,500 h.p. for the driving of deck and engine machinery, 6,000 switches and control units, together with complete electric lighting, bells, and a fire alarm system.

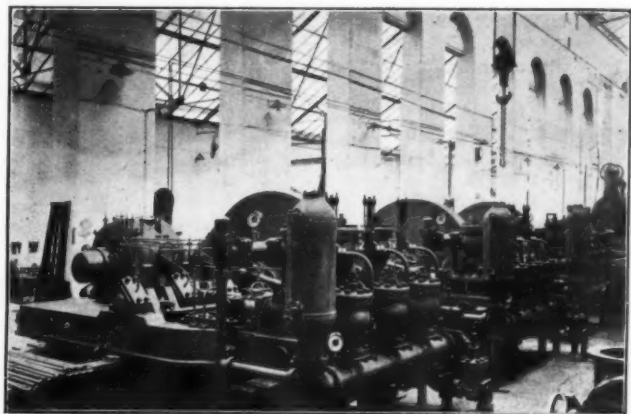
A new development during the year consists of a line of self-contained synchronous induction motors of the end-shield pattern, covering outputs of from 150 h.p. to 600 h.p. In this type of machine the slip-rings are mounted inside the end-shield, and the exciter yoke is mounted on the end-shield, the armature being overhung from the main bearing. This type of construction permits a compact machine, easy to mount on foundations since no independent support for the exciter yoke is needed, nor is any bedplate necessary, the machine being handled and mounted exactly like the end-shield pattern of induction motor. The synchronous induction motor is being built in large numbers by the G.E.C., which firm is also building the "All-watt" Witton motor which again is of interest from the point of view of power factor correction. In view of the increased capacity of modern generating stations, many supply authorities allow larger starting currents to be taken by motors than hitherto. To meet these new conditions the G.E.C. has developed the high starting torque Witton squirrel cage motor, which, with auto transformer starting, will give full starting torque when taking roughly twice full load current.

Another interesting feature of the year's work is the development by Metropolitan-Vickers of a new line of ball and roller bearing a.c. motors so constructed that they can be dismantled and re-assembled without disturbing the press fits of the bearings. The facility thus given in regard to inspection and cleaning brings the advantage of ball and roller bearings construction within the reach of the overseas user, to who the necessity of skilled labour for refitting the ordinary type was often a serious difficulty.

Calcutta Dock Extensions.

Electrically-Driven Treble-Ram Accumulator Pumps for Kidderpore Dock.

In connection with the extensive dock extension scheme at Calcutta* four sets of electrically-driven, horizontal, treble ram hydraulic pumps have been commissioned by Messrs. Glenfield and Kennedy, Ltd., of Kilmarnock. These are for the Jetty Pumping Station at Kidderpore Dock, the consulting engineer of which is Mr. J. Angus, M.Inst.C.E., of London, and they follow upon other equipment supplied by the same firm to King George's Dock.



View of the Treble-ram Pumps supplied to the Jetty Pumping Station, Kidderpore Dock, Calcutta.

The rams are 6½ in. diameter with 18 in. stroke, and the duty is 300 gallons of water per minute against a pressure of 750 pounds per sq. in., running at a standard speed of 53 revolutions per minute, corresponding to a pump horse-power of 157.5 and a ram speed of 159 ft. per minute. The drive in each case is given by a self-contained 210 b.h.p. electric motor, operating at 415 revolutions per minute, with a single reduction double helical machine cut gear, the wheel being of cast steel and the pinion of steel forged solid with the shaft, while the width of the gearing, which is totally enclosed in a sheet steel casing, is 12-in.

The fine character of the castings may be seen from the illustration, while another feature indicated is the special system of automatic lubrication for each journal of the installation. Incidentally also these views, which are taken in the heavy

* A detailed description of the Scheme appeared in the issue of February, 1927.

erecting bay of Messrs. Glenfield and Kennedy's works at Kilmarnock, show the ample head room available for dealing with work of the largest character, the height for example from the floor to the overhead crane rails being 40 ft.

With regard to King George's Dock, Calcutta, Messrs. Glenfield and Kennedy have received some additional orders for the hydraulic installation which include two "Glenfield" hydraulic accumulators for a working pressure of 800 lbs. per sq. in., each having a ram 30 in. diameter by 16-ft. stroke. These also represent the latest practice, with cylinder gland and guide brackets of cast steel, the baseplate, ram, crosshead and inlet pipe of cast iron, and the gland pipe bushed with gun-metal. Further, there is included in the contract a large quantity of cast iron hydraulic pipes and "specials," together with a delivery chest of cast steel, suitable for a working pressure of 700-900 lbs. per sq. in., tested to 2,500 lbs. pressure, as well as 25 "Glenfield" cast iron hydraulic stop valves, tested to 2,500 lbs. per sq. in.

Shipping Traffic at Hamburg.

Figures for 1927 Show Big Advance.

A report received by the Department of Overseas Trade from His Majesty's Consul-General at Hamburg states that there was an increase of approximately 130,000 tons in the total tonnage entered at the port in December as compared with November, which was mainly accounted for by an increase in the tonnage entered with cargo. The total tonnage cleared showed an increase of 280,000 tons, of which 240,000 tons represented tonnage cleared with cargo.

There was during the 12 months ended December 31st, 1927, a total increase of upwards of two million tons entered and of approximately two millions cleared, figures which are far in excess of any previous year. In 1923 the tonnage entered and cleared, for the first time, exceeded the total of 1913 and each year since 1923 has shown a further increase. Of the total tonnage entered in 1927 upwards of 18 million tons were with cargo, while of the total cleared approximately 15 million tons only were with cargo.

British shipping in December amounted to 234 vessels (452,904 tons) entered and 241 vessels (457,336 tons) cleared, compared with 209 vessels (389,802 tons) entered and 221 (410,451 tons) cleared in November.

German tonnage in December amounted to 730,082 tons entered (661,347 tons in November) and 775,181 tons cleared (669,920 tons in November).

Personal enquiries regarding all shipping and transport matters should be made at the City Office of the Department (Shipping and Transport Section), 73, Basinghall Street, London, E.C.2.

The Junior Institution of Engineers.

The Economy of Steam Accumulators.

At a meeting of the Junior Institution of Engineers, held in London on January 20th, Mr. Stanley Hopkins, speaking on the subject of "Steam Accumulators," said that the principles of steam accumulation by storage of heat in water had been long known, but their exploitation had been newly revived, and the method of their utilisation in industry had evolved a new means of economy. A steam accumulator was generally of value only where the demand for or supply of heat in a works was variable, and then by storing heat when the supply exceeded the demand and by giving up the reserve of heat when the demand became the greater quantity, an accumulator enabled the boilers to work at a more uniform and efficient rate, besides giving the advantages of the reserve for peak loads.

The two systems of accumulation generally adopted were known as the falling pressure and constant pressure systems. The first depended on the condensation of steam in water under rising pressure and its discharge as steam under falling pressure. In the second system the water heated up by steam in the accumulator was used as boiler feed water on discharge, and only so much water was used as would take up the available heat. Mr. Hopkins said that proper means of control of this system had been devised, and the system had been installed a good deal on the Continent, where it was giving results worthy of attention in this country.

The problem of dealing with economisers, when water was being fed from the accumulator and the ordinary feed pump was slowed down, had been investigated, but in practice no excessive rise in temperature in the economiser was encountered.

Mr. Hopkins referred to the use in actual practice of electric boilers in conjunction with accumulators in power stations, especially those using water power, in order to create a reserve of energy for peak loads or breakdowns.

Port of Rangoon.

Administration Report for the Year 1926-27.

Receipts for the year amounted to Rs.79,68,002 and payments to Rs.76,99,522, leaving a surplus on the year's working of Rs.2,68,480. Comparing these figures with those of the previous year, receipts show a decrease of Rs.6,20,930. The principal reason for this decrease is the reduction in the rate of the river due on all goods discharged from or shipped into sea-going vessels from 7 annas to 5 annas, which took effect from 1st August, 1926. Payments show a total increase of Rs.3,65,746, the largest individual item being Rs.1,40,537 on account of interest on loans.

Payments for the year on Capital Account amounted to Rs.63,86,609, of which Rs.33,17,914 was in respect of the overdraft at 1st April, 1926. Two loans of the total nominal value of Rs.105 lacs were raised during the year. These loans which realised Rs.1,07,21,250 gross bear interest at the rate of 5½ per cent. per annum and are repayable at par in 1957.

The loan indebtedness at the 31st March, 1927, amounted to Rs.4,74,00,674, while the amount (including investments at cost) standing at the credit of the sinking funds at that date was Rs.1,46,93,175. A valuation of the sinking funds at the 31st March, 1927, showed a surplus in the funds of Rs.27,86,697. In view of this surplus a re-adjustment of the amount of the annual contributions to these funds has been made in the 1927-28 Budget.

The total of the accumulated balances at the credit of the reserve funds on the 31st March, 1927, was made up as follows:

	Rs.
Revenue Reserve	52,35,540
Fire and Marine Insurance	26,25,917
Depreciation and Replacement	24,32,939
Special Reserve	1,71,744
	1,04,66,140

Pilot Fund receipts for the year amounted to Rs.6,28,738, and payments to Rs.6,35,821, leaving a deficit on the years' working of Rs.7,083. This small deficit is due to the increase of the rebate on pilotage fees from 10 per cent. to 20 per cent. effected from 1st April, 1926.

TRAFFIC.

Sea-going vessels entering the port comprised 1,448 steamers with an aggregate nett tonnage of 3,813,564 and 192 sailing ships with an aggregate nett tonnage of 13,233. The number and tonnage of vessels compared with the previous year shows a decrease of 65 in number and 235,735 tons in nett tonnage.

Of the total number of vessels entering the port, 1,439 brought cargo to Rangoon, and of this latter number 969 vessels came alongside the Commissioners' wharves, pontoons and jetties to discharge.

The total sea-borne trade of Rangoon during the year was 4,994,324 tons, of which 1,479,873 tons were imports, 3,501,557 tons exports, and 12,894 tons transshipment. The following table shows the proportion of the sea-borne trade handled over the Commissioners' premises as compared with the previous three years:—

Description of Trade	1923-24 Tons	1924-25 Tons	1925-26 Tons	1926-27 Tons
Imports—				
Landed	700,792	810,813	889,996	940,977
Discharged overside for delivery	29,889	34,655	29,039	41,116
Exports—				
Shipped	641,029	639,357	799,874	773,513
Transshipment—				
Transhipped	2,626	1,964	1,625	3,445
Total trade (sea-borne)	4,413,305	4,606,116	5,364,367	4,994,324
Total trade passing over Commissioners' premises	1,344,447	1,452,134	1,691,495	1,717,935
Proportion of total trade passing over Commissioners' premises—				
Imports	53.7	64.3	61.8	63.6
Exports	20.7	19.2	20.4	22.1
Transshipment	26.3	22.7	14.2	26.7

TRAFFIC OVER COMMISSIONERS' PREMISES.

Goods passed over the Commissioners' premises during the year amounted to 3,182,343 tons. This total is slightly less than that of the previous, the record year, for whereas sea-borne imports increased by some 50,000 tons there was a considerable drop in exports and rail-borne traffic, due to the serious breaches in the railway during the monsoon of 1926 and the consequent interruption of minerals traffic.

The following statement gives a summary of the tonnage under the heads of sea-borne, river-borne and rail-borne traffic for the last four years:—

Description of Traffic	1923-24	1924-25	1925-26	1926-27
Sea-borne traffic—				
Imports landed	700,792	810,813	889,996	940,977
Exports shipped	641,029	639,357	799,874	773,513
Transhipped	2,626	1,954	1,625	3,445
River-borne traffic—				
Landed	448,295	451,239	473,474	465,382
Shipped	335,235	352,932	370,033	374,880
Rail-borne traffic	465,182	487,557	655,154	608,423

PASSENGER TRAFFIC.

During the year 338,529 passengers from seaports landed at Rangoon, and 289,881 embarked for such ports at the Commissioners' wharves and jetties as compared with 307,698 and 293,059 passengers in the previous year.

WAREHOUSES AND MAGAZINES.

The revenue for the year amounted to Rs.1,56,933 as compared with Rs.1,53,806 in 1925-26. The tonnage passing through the duty-paid and bonded warehouses shows a small increase. Warehouse accommodation was increased during the year by the addition of P godown, Brooking Street. The licensed capacity of the Commissioners' magazine at the close of the year was 68,900 lbs. explosives and 290,000 detonators.

LANDS AND BUILDINGS.

The revenue from lands and buildings was Rs.1,15,603 below that of the previous year. The following table shows the main sources of revenue under this head for the years 1925-26 and 1926-27:—

Sources of Revenue	1925-26	1926-27
1. Lands, including those administered by the Rangoon Development Trust	4,57,994	4,47,913
2. Godowns	4,20,408	4,16,319
3. Refreshment stalls	32,904	34,045
4. Other buildings	20,780	18,377
5. Depot for Mandalay steamers	67,938	63,379
6. Municipal Strand market	1,75,000	50,615
7. Municipal Strand market site	—	28,773
Total	11,75,024	10,59,421

The decrease under "Municipal Strand market" is due to the Rangoon Corporation giving up their tenancy to the new Scott market.

PORT APPROACHES.

New surveys of the river bed from harbour limits to North D'Silva Point; North D'Silva Point to Kyauktan or Hmawun Creek; and entrance to Rangoon river were undertaken and completed during the year. The survey of the Rangoon Harbour and of the wharves and moorings is nearing completion. The various surveys undertaken during the year on the whole disclose a satisfactory state of affairs. The survey of the Western channel shows that from the lower Spit buoy along the coast to the south-westward there had been much silting, while from the upper Western buoy right down the coast to nearly abreast of the Fairway buoy the 12 foot contour had extended to the eastward a distance of three to four thousand feet. The silting further to the north-east has necessitated the moving of the Centre Western and Upper Western buoys to the eastward 5,000 and 2,000 feet respectively. The three western buoys and the lower Spit buoy now lie in a straight line, and the best channel runs about 1,500 ft. to the eastward of this line. The indications of a channel forming to the eastward of the Centre Eastern buoy continue favourable. The Spit channel is in good condition, having improved since last year. The surveys of the Middle Bank channel in June, 1926, showed a bar had formed across the channel and reduced the available water to 20 ft., but after July it practically disappeared. Apart from this bar the Middle Bank channel remained in fair condition.

The Monkey Point channel steadily deepened during the year owing to the effect of the new King's Bank groyne. Another effect of the groyne is the slow but steady formation of a channel across the Hastings shoal in continuation of the line of the groyne. The Danidaw reach has also deepened, but not to the same extent as the Monkey Point channel. The inner harbour was sounded in June and July, 1926, when the conditions compared somewhat unfavourably with the previous examination in March, 1926. The difference lay mainly in the position of the 30 ft. contour which in July tended to intrude in patches into the deeper water. The eastern end, Botatoung lumps, was sounded in October and found to be in good condition. The survey of the Bassein Creek carried out at the end of 1925 and beginning of 1926, shows a slight general improvement of navigability everywhere except for a section lying within about one and a half miles on each side of the village of Wapalouk, about eight miles from the Rangoon river end of the creek.

The dredger *Cormorant* worked in the Monkey Point channel, Danidaw reach, Western approach, Dalla fixed moorings locality and approach to the Kanoungto creek. She dredged for 232 days, removed 1,075,600 tons of sand and silt, and maintained a depth of not less than 14 ft. reduced in the principal channels of the river. The dredger *Hastings* worked on the berths at the wharves and jetties. She dredged for 150 days and removed 180,415 tons of spoil.

COMMISSIONERS' FLOTILLA.

The various units of the flotilla were overhauled and necessary repairs carried out during the year. The general condition of the craft, with the exception of the m.l. *Strathnaver*, which is to be replaced, is reported as being good. The additions to the flotilla were:—

- Motor dinghy *Quest* to replace a survey jolly boat, built at the Government dockyard, Rangoon, and
- Motor launch *Active* to replace the s.l. *Patrol*, built by the Hoogly Docking and Engineering Co., Ltd., Calcutta.

The following were under construction:—

- (a) At the Government dockyard, Rangoon:—
Launch to replace the *s.l. Ahlon*.
- (b) At the Irrawaddy Flotilla Company's dockyard, Rangoon:
New buoy vessel to replace the *Samson*.

TIDAL AND TIME BALL OBSERVATORY.

There were 171 transit observations of the sun and 69 of the stars made during the year. Meteorological observations were recorded, and the results published in the local papers. The coldest day in the year was 20th August, 1926 (79.0 deg.), and the hottest day was 13th May, 1926 (102.1 deg.), while the rainfall for the year amounted to 83.81 inches as against 87.11 inches in 1925-26.

The self-registering tide gauge worked satisfactorily during the year. The highest recorded high water during the year was 21 ft. 7½ in. on 24th and 25th August, 1926 (p.m. tides), and the lowest low water was 11½ in. on 13th April and 21st December, 1926 (p.m. tides).

REGISTRATION OF CARGO BOAT TINDALS.

At the instance of the Commissioner of Police and with the approval of the Local Government, a scheme for licensing cargo boat tindals with a view to checking thefts from these boats was approved and introduced with effect from 1st January, 1927.

Wireless telephonic communication between the pilot vessel and the Commissioners' office was established and brought into use from 1st December, 1926. An auxiliary set was installed on board the relief pilot vessel. The installation has been of considerable assistance and has worked well with the exception of one or two short interruptions due to atmospheric conditions. When its working during a monsoon season has been experienced, it will be possible to gauge more accurately the success of the installation.

In view of the contemplated closing of the Elephant Point Telegraph station, a scheme is being prepared to provide for the use of the installation for the transmission of shipping intelligence.

CASUALTIES TO SHIPPING.

Casualties to sea-going vessels within the port numbered 22, all of a minor nature. Nine of the vessels were in charge of licensed pilots, twelve in charge of assistant harbour masters, and one miscellaneous. The 21 cases were enquired into departmentally; in one case the pilot concerned was censured, and in another the assistant harbour master in charge of the vessel was directed to use more caution in future.

NEW WORKS AND CAPITAL EXPENDITURE.

During the year under review work was commenced on the development schemes approved by the Commissioners and referred to in paragraph 16 of last year's administration report. Progress made on the various schemes is detailed below:—

1.—Wharves for sea-going vessels: An estimate amounting to Rs.45,016 for preliminary investigations and other works connected with the joining up of Sule Pagoda and Latter Street wharves was sanctioned. It is proposed to give priority to this section of the wharves extension and reconstruction scheme in order to provide at the earliest possible date an additional berth 515 ft. long, equipped with a double-storeyed transit shed 430 ft. long by 150 ft. wide, in three spans, to meet the requirements of the port in wharf and shed accommodation. Detailed plans and estimates are under preparation.

An estimate amounting to Rs.2,83,153 for the construction and equipment of a passenger depot at Phayre Street was sanctioned in October, 1926. Construction is in abeyance pending negotiations with the owners of Block "F" regarding the erection of buildings on this river frontage.

2.—Inland vessels traffic at Lanmadaw: Borings were taken at Keighly Street jetties Nos. 1 and 2 and an estimate for preliminary works for the reclamation of the foreshore between the Ywathit Creek on the west and Latter Street on the east is under preparation.

3.—Inland vessels traffic at Botatoung: An estimate amounting to Rs.11,69,290 for the equipment of a depot at Botatoung for inland vessels traffic was sanctioned in April, 1926, and work was commenced immediately. During the year a large proportion of the roads, surface drains and water mains were completed. All old buildings on the site were dismantled. Blocks A and B of steel frame godowns were taken into use on the 1st November, 1926, and 1st January, 1927, respectively. The foundation for transit sheds Nos. 2 and 3 and godown blocks C and D were completed departmentally, and contracts were entered into for the superstructure of these and other buildings, but owing to non-receipt of the steelwork on account of the coal strike in England, construction was not commenced until after the end of the year. Foundations and masonry work for the office and godown for the Irrawaddy Flotilla Company, Limited, were completed. The screw-pile portion of the two approaches to the east pontoon was completed and bracings fixed, but delay in delivery of the steelwork not only prevented erection of the superstructure, but also of the piling of the approaches to the west pontoon. It was decided to construct the approaches to the middle pontoon on timber piles.

4.—New Import Salt Depot at Pazandung: An estimate amounting to Rs.12,50,000 for the equipment of this depot was sanctioned. Reclamation of the site, approximately 9½ acres, was not commenced until 19th April, 1926, owing to the difficulty experienced in getting the former tenants to vacate, and was completed in December, 1926. Foreshore revetment was commenced, but as there was a tendency for the foreshore to slip, it was decided to suspend the work and protect the foreshore by means of brushwood mattresses, the revetment being constructed later. The greater portion of the mattress work was completed. The area has been fenced and the work of construction of the timber jetty, roads, drains, and foundations of the godowns was proceeding. Contracts for the superstructure of 33 godowns were entered into and satisfactory progress was reported.

5.—Development of Dawbon Estate: An estimate amounting to Rs.21,00,000 for protecting and revetting the right bank of the Pegu River for a length of 7,800 ft. between the Hlaing-bonglay creek and the Burmah Oil Company's boundary was considered, and it was resolved that in the first instance Government be addressed with a view to the Commissioners obtaining a clear title to the foreshore to be protected. The matter is under investigation in conjunction with the Rangoon Development Trust.

6.—Moorings for sea-going vessels: The plant required for Block No. 2, the first of the proposed two new blocks of six-berth fixed moorings, was ordered early in the year. Owing to its late arrival on account of the coal strike and the buoy vessel being employed throughout the latter part of the year in overhauling channel moorings and lighted buoys outside Elephant Point, the work of laying the new moorings was delayed.

The progress made on new works other than those embodied in the Port development schemes referred to in the preceding paragraph is detailed below:—

1.—(a) King's Bank Reclamation scheme: Satisfactory progress on this project continued throughout the year. The foundation mattress work was completed on 22nd April, 1926; the total number of mattresses made and sunk was 106. The full cover of stone on the apron was completed for a distance of 5,375 ft., and by the end of the year the total quantity of stone deposited on the apron and foundation amounted to 3,043,743 cu. ft. In addition to this amount 3,217,509 cu. ft. of stone was placed on the centre line to form the body of the wall.

(b) Land acquisition.—About 16.275 acres of submerged land forming part of the river bed adjoining holdings Nos. 2 and 4 of 1925-26 in Pyinmagon kwin, Pyawbwe circle, Twante township, were acquired from Rao Bahadur S. Ramanatha Reddiar in connection with the King's Bank training wall.

2.—Houses and quarters for staff: Four sites aggregating 5.741 acres of land at Windermere Park were purchased from the Rangoon Development Trust for quarters for Commissioners' officers at a cost of Rs.33,011 plus a proportion of the cost of sewage equipment, roads and overhead charges. An estimate for the erection of two houses amounting to Rs. 1,12,140, exclusive of the cost of connections to the Government water and sewage systems and proportionate cost of roads and roadside drains on the estate was sanctioned. Negotiations for the purchase of two additional sites at the estate were entered into with the Development Trust, but the transaction was not completed at the close of the year. The two semi-detached houses for the Assistant Stores and Assistant Mechanical Superintendents at Botatoung were completed and occupied early in the year.

3.—Stores and workshop extensions: At the stores the extension of the main railway siding and construction of a new approach road and fixed jetty with a 10-ton crane for handling buoys and other heavy lifts were completed. The new works completed at the workshops during the year were a 60 ft. slipway, an extension to the foundry and construction of pattern-makers' shop and stores.

4.—New offices: An estimate amounting to Rs.16,25,335-7-3 for the construction of new offices was sanctioned, and work on the building proceeded throughout the year. The piling of the foundations with "Monolith" concrete piles was completed in July, 1926, at a cost of Rs.1,80,597-5-0; the number of piles driven being 517. A contract for the supply and erection of the steel frame work for the building was entered into with Messrs. Dorman Long and Company, and the work completed in January, 1927, at a cost of Rs.2,95,66. Work on the superstructure was commenced in January, 1927, by Messrs. Clark and Greig, Limited, whose tender of Rs.9,58,659 had been accepted; the date for completion of the contract is the 24th May, 1928.

GENERAL.

MUNICIPAL STRAND MARKET.

The Corporation of Rangoon closed the Municipal Strand market on the 1st June, 1926, and the Commissioners took possession of the site and buildings on the 10th July, 1926. In accordance with an agreement entered into in 1920, the Commissioners paid to the Corporation the sum of Rs.50,000 for the buildings. Three railway sidings were laid and a portion

of the buildings has been repaired and let to traders engaged in wholesale and riverine trade. The question of vesting the site of the market in the Commissioners is under the consideration of Local Government.

INDIAN PORTS' ASSOCIATION.

At a conference held in Calcutta in February, 1926, of chairmen of the major Indian ports, proposals were considered in regard to the organisation of a permanent association of Indian Port Authorities on the lines of the British Association. It was unanimously agreed that such an organisation, which should include all major ports, was highly desirable, as it would facilitate consultation and co-operation on questions of common interest and on matters requiring combined action. The proposal was approved by the Commissioners at their meeting on the 8th September, 1926.

BY-LAWS OF THE COMMISSIONERS' AND PILOTS' PROVIDENT FUNDS.

Consequent on the passing of the Provident Funds Act, 1925, which came into force with effect from 1st April, 1926, the by-laws framed by the Commissioners under section 26 (f) of the Rangoon Port Act, 1905, for the establishment of Provident funds for the benefit of their employees and members of the Rangoon Pilot Service were amended during the year to correspond with the provisions of the amended Act.

RIVER TRAINING OPERATIONS.

Consideration was given to a report, dated 5th March, 1926, by the Commissioners' Chief Engineer, calling attention to the serious effects on the maintenance of Rangoon as a deep water port which may be expected to result from the river training operations being carried out by the Forest Department at the headwaters of the Rangoon River. It was agreed that the chairman and chief engineer, when on leave in England, should confer with Messrs. Sir Alexander Gibb and Partners in order that expert advice on this and other port problems might be obtained with a view to submission to the Commissioners of a report on the whole matter. Meanwhile, a copy of the chief engineer's report was forwarded to Government with an intimation that the Commissioners were submitting the question for consideration and report by Messrs. Sir Alexander Gibb and Partners, and a further reference would be made on receipt of the report. Messrs. Sir Alexander Gibb and Partners submitted their report, dated 24th November, 1926, which, together with a note by the chief engineer, was considered by the Commissioners at their meeting on the 2nd February, 1927, when they accepted the recommendations made and resolved, when submitting the report to Government, to urge the early constitution of a competent authority for the administration of the Irrawaddy and Rangoon River systems in order to effect co-ordination of conflicting interests and the acquisition of experience and practice, as, in their opinion, such an authority is required to formulate proposals for the investigation of the various problems and to direct such surveys and other requirements as are considered essential by the departments concerned.

REFERENCES FROM GOVERNMENT.

The Commissioners were consulted by Government on the following subjects during the year:—

- 1.—Marking of the weight of packages on board ships.
- 2.—Proposed legislation for the prompt payment of wages to industrial workers.
- 3.—Bill to amend the Indian Factories Act, 1911.
- 4.—Light House administration in Burma.
- 5.—Rangoon Health Committee.
- 6.—Proposed extension of the application of the Workmen's Compensation Act, 1923, to persons employed for the purpose of loading and unloading ships.
- 7.—Bill to provide for the better treatment and prevention of venereal diseases.
- 8.—Proposed termination of the Government contract with the Burma Railways Company and questions connected with the future management of the Burma Railways if this contract should be determined.
- 9.—International Sanitary Conference, 1926.

AMENDMENT OF THE RANGOON PORT ACT.

The Rangoon Port (Amendment) Act referred to in paragraph 18 of last year's report was brought into force from 1st June, 1926, and the following gentlemen were appointed to be Port Commissioners:—

Appointed by Government.—Captain A. St. C. Bowden, R.I.M., to represent the Admiralty and Marine interests of Government.

Mr. W. Keay to represent sea-going shipping.

Mr. R. Sinclair to represent inland shipping.

Elected to represent the interests of the Burma Chamber of Commerce.—Messrs. W. A. Gray, W. T. Howison, J. Hogg, M.L.C., and W. G. Lely.

U Ba Pe, M.L.C., to represent the Municipal Corporation of Rangoon.

Mr. J. Fisher to represent the Rangoon Trades Association.

Mr. Kheng Beng Chong, M.L.C., to represent the Chinese Chamber of Commerce.

Elected to represent the Burma Indian Chamber of Commerce.—Messrs. A. Chandoo and Ranchordas H. Gandhi.

U Thwin to represent the Small Rice Millers' Association.

Mr. A. E. Boyd, Collector of Customs; Lieut.-Colonel E. Butterfield, D.S.O., I.A., M.L.C., Acting Chairman, Rangoon Development Trust; and Mr. W. Kendall, Acting Agent, Burma Railways, became Commissioners by virtue of their offices under clauses (e), (f) and (g) of section 7 of the Act. Since the date of the reconstitution of the Board the following changes have occurred amongst the Commissioners:—

Members	Succeeded by	Remarks
Mr. W. G. Lely ...	Mr. C. G. Wodehouse ...	Elected by the Burma Chamber of Commerce
Mr. W. T. Howison ...	—	—
Mr. J. Hogg ...	—	—
Capt. A. St. C. Bowden, R.I.M. ...	Capt. C. R. Goad, R.I.M. ...	Appointed by Government
Mr. R. Sinclair ...	Mr. W. T. Henry, M.L.C. ...	—
Mr. W. Kendall ...	Mr. B. M. Crosthwaite ...	By virtue of their offices
Lt.-Col. E. Butterfield, D.S.O., I.A. ...	Mr. J. E. Houldey, B.A. ...	—
—	I.C.S., M.L.C. ...	—

Mr. J. Hogg was appointed vice-chairman on the 13th April, 1926, vice Mr. J. W. Richardson, resigned.

Mr. J. Hogg, M.L.C., vice-chairman, retired from the Board on the 22nd March, 1927, and at their ordinary meeting on the 6th April, 1927, the Commissioners passed the following resolution:—

"The Commissioners record their high appreciation of the services rendered to the port by Mr. J. Hogg during his service as a Port Commissioner and as their vice-chairman."

The Commissioners record with pleasure their appreciation of the good services rendered by the heads of departments and their staffs during the year.

A Renfrew Launching.

Suction Dredger for India.

Messrs. Wm. Simons and Co., Ltd., Renfrew, launched on January 24th the cutter suction hopper dredger *Patunga* which they have constructed for the Commissioners for the Port of Chittagong for work there. It was built under the direction of Messrs. Rendel, Palmer and Tritton, Consulting Engineers, London.

The vessel is fitted with two sets of triple expansion surface condensing engines, and steam is supplied by three cylindrical multitubular boilers, fitted with forced draught. The dredging outfit consists of a set of triple expansion engines, driving a centrifugal pump, coupled to a suction pipe, fitted in a frame carrying a cutter, designed for disintegrating compact material, the cutter being driven by gearing from an independent set of compound engines. The suction frame is designed to dredge to a depth of 45 ft. under water, and arranged to take a drag suction nozzle when required. "Simons" patent suction keelsons are fitted to the hopper, so that the load may be discharged overboard through a floating pipe line, in addition to the usual bottom discharge by means of doors.

The engine room outfit includes independent condensing plant, automatic feed pumps, bilge pumps, service pumps, filter and evaporator. An outfit of machine tools is provided, capable of dealing with minor repairs.

The naming ceremony was performed by Mrs. Tritton, wife of Mr. Julian Tritton, of Messrs. Rendel, Palmer and Tritton, London.

Association des Grand Ports Francais.

Bordeaux Railway Connections.

At the January meeting of the Association des Grand Ports Français, presided over by Senator Brindeau, President of the Mercantile Marine Examining Commission, the assembly examined the various matters concerning seaports and hinterland rail connections, and approved the building of railway line joining Havre to the left bank of the Seine. The scheme introduced by the Port of Bordeaux for the following railway facilities also met with approval.

1. The building of the Commentry-St. Germain des Fossés section of a cross line from Bordeaux to Lyons for improving traffic between Bordeaux and Central Europe.

2. The completion of the Libourne-Langon line giving Paris and Central France easier communication with the south-west areas.

3. Improvement and electrification of the Bordeaux-Pointe de Grave line.

The General Secretary, Mons. Gustine, detailed on behalf of the Port Authorities the criticisms of the present railway tariffs. Delegates of both harbour boards and shipping companies agreed to apply for the re-establishment of the pre-war rate of transport taxation, as they considered that it would increase production, traffic and railway profits. They insist in being consulted whenever tariffs are to be altered.

Notes from the North.

EGREMONT FERRY NOT TO BE USED.

Whether or not one of the River Mersey ferries, that at Egremont, should be continued was decided by the Wallasey Council on February 13th. The Ferries Committee formed the opinion that, viewed from a purely financial standpoint, there can be no two opinions as to the advisability of closure. Other considerations exist, however, such as the value of the landing for possible emergency use in the remote event of serious damage to the Seacombe landing stage. It has been ascertained that the annual cost of manning and maintaining this landing is approximately £4,000 odd, while the annual charges arising from the cost of reconstruction would be over £1,800, so that in round figures a sum of £6,000 per annum is involved. On the other hand, however, it must be stated that the annual income from the turnstiles is £6,000, and from contract tickets £8,750. The contention is that if Egremont Ferry were closed, the upkeep cost would be saved, while the £14,750 income would necessarily be distributed between the other two ferries. The work of reconstruction and strengthening of the pier bridge and landing stage has long been overdue, and the unreliability of the present structure in case of an unusually serious strain from storms, tide or accident, has been frequently emphasised. When the matter was investigated a few months ago it was estimated that an expenditure of £24,000 will be necessary. Tenders were then invited, the intention being to close the ferry for a few weeks prior to Easter while the work of reconstruction was proceeded with. When, however, the lowest tender was found to be about £30,000, the Council referred back the recommendation of the Ferries Committee for further consideration. When the closure motion came before the Council on February 13th, it was again referred back to the Ferries Committee for further consideration. The closing of Egremont Ferry would mean that the Council would have to proceed with the deferred work of reconstruction at Seacombe, where it is proposed to provide improved facilities for ferry passengers and also improved conditions for the tramways and bus traffic.

TUNNELLING LIVERPOOL DOCKS.

The Mersey Joint Tunnel Committee reports that an additional shaft, preparatory to the contract for the full-sized tunnel, has been sunk at George's Dock, Liverpool. An additional shaft for the same purpose is being sunk at Morpeth branch dock site in Birkenhead (where a length of full-sized tunnel is already under construction). Of the total borings contracted for, 14,255 ft. out of 17,300 ft. is complete, or 82.5 per cent. Under the river, on the upper trial boring, the distance yet to be bored is 921 ft.; and on the lower heading 547 ft. If the rate of progress achieved during the last month can be maintained, less than two months will be required to drive these 547 ft., indicating the early part of April as a probable date for the borers from Liverpool and Birkenhead to meet. Borings made from the face of the lower river heading at Liverpool disclosed the existence of a fault, or fissure, some 2 ft. in width, at a distance of 2,350 ft. from the entrance of the Liverpool shaft. The fault appeared to be filled with clay, and no flow of water was encountered in the boring.

DEFINITION OF THE PORT OF LIVERPOOL.

Whether or not Birkenhead is within the limits of the Port of Liverpool was the issue in an action at the Liverpool Assizes on February 7th and 8th. The Judge held that, for the purposes of a charter party and a bill of lading, Birkenhead is part of the port. This is not the first time the issue has been raised. As far back as 1884, in the Liverpool County Court, Judge Collier held Birkenhead to be part of the Port of Liverpool, but on that occasion the Judge had based his decision upon the statutory definitions of the port contained in the Mersey Dock Act of 1857 and the Consolidation Act of 1858.

HEAVY DAMAGE TO BIRKENHEAD STAGE.

Serious damage has been caused to the Woodside Ferry landing stage by the small 233-ton coasting steamer *Jennie*, which crashed into the stage and sunk under the ferry gangway, thus causing interference with river traffic. The position of the steamer could hardly have been more awkward from the point of view of the ferry passenger boats. When the *Jennie* canted and filled, the ebb tide forced her under the stage, from which her prow projected almost immediately beneath the southern ferry gangway. The south part of the stage rested on *Jennie's* side, with the result that it was raised many feet and the structure's girders and beams cracked under the strain. As the steamer was pushed further under the stage by the pressure of the tide, great thuds could be heard, causing some little alarm. The Mersey Dock and Harbour Board's wreck vessel, *The Salvor*, arrived early on the scene to attempt to put a wire rope round the *Jennie* so that she could be moved at the first available ebb tide. This was only accomplished after great difficulty. A survey of the pontoons and the underpart of the stage revealed that at least four of the pontoons would require replacement, and that a large portion of the stage itself would

have to be rebuilt. Fractures exhibited themselves in the under-structure, and iron girders two feet or more in thickness were snapped in two through the strain placed on the stage at low water. The iron posts supporting the roof over the waiting space for passengers also snapped, and, pending complete renewal, the roof was supported by heavy baulks of timber. Between the most southerly gangway and the luggage stage a decided "kink" in the woodwork of the stage was visible. While the southern portion of the stage is being rebuilt, the passenger portion is being boarded off, and for a time only one gangway can be used. The cost will run into some thousands of pounds.

DIFFICULT REPAIRS TASK.

The work of repairing the Woodside floating landing stage is proving a difficult and delicate operation. Four of the 27 pontoons supporting the stage have been condemned as unsafe. In cubic measurement each of these pontoons is about 80 ft. by 10 ft. 6 in. by 10 ft. 9 in., and accordingly their removal was a heavy task. Divers have descended beneath the stage and fastened strong wires round the pontoons, which were then filled with water so that they would sink clear of the stage, and afterwards pumped dry again to refloat them. The most awkward job was the removal of the last pontoon, which was in two pieces, one of which was towed to Rock Ferry and the other left at Woodside. Four pontoons hired from the Mersey Docks and Harbour Board have been fitted in place of the old ones. At a later date the Ferries department will probably purchase new pontoons to replace those hired from the Dock Board. Two other pontoons are damaged, but are capable of repair.

FUTURE OF THE RIVER DEE.

The future of the River Dee for commercial purposes was discussed at the annual meeting of the Dee Conservancy Board at Chester on February 6th. The report of the Acting Conservator (Mr. A. Caradoc Williams) stated: "The deposit of stone on the northern training wall below the breach was discontinued in May, 1927. The training wall above the breach has been maintained and is generally in good order. The extension of the high training bank has been continued, and the total length at the end of December was 2,165 yards. This work has resulted in a further improvement of the channel. The return supplied by the Board's collector of the number and tonnage of vessels arriving at the several stages on the river for 1927, as compared with 1926, shows an increase in number of 388, and an increase in tonnage of 30,398. For the wharves, Chester to Connah's Quay inclusive, the figures are the highest recorded during the last 34 years."

Alderman Powell said he was looking forward to the time when they could get through the clay at Bagillt and have a navigable river there, and they could get two feet more water in the Dee than they had in the Mersey at the bar. If the Board had pluck and enterprise they would be able to improve the river and make it navigable, as rivers worse than the Dee had been made navigable.

SERIES OF IMPORTANT IMPROVEMENTS.

The fact is worthy of note that the London, Midland and Scottish Railway Company is applying itself to a scheme for the modernisation of its equipment at the northern ports so as to provide better discharging and loading facilities at their docks. The Fleetwood scheme, which will cost £100,000, and which has now been commenced, will make that port one of the most up-to-date fishing ports in the country. At the L.M.S. Docks, Garston, Liverpool, a new dredger and a series of dolphins in the entrance channel to facilitate the docking of vessels are to be provided. At this part of the Liverpool Dock Estate, many vessels using the River Mersey are re-fuelled, and plans are in process of execution for alterations to the seven coaling appliances so that their capacity will be increased from 16½ to 20 tons. At Barrow-in-Furness a new dredger and two 7-ton electric cranes are to be installed. A further proposal is to effect improvements at Wyre Docks to the slipway and berths for the repair of vessels.

NEW DOCK OFFICES.

The Ribble Committee of the Preston Corporation has for some time had under consideration site plans for the proposed new dock offices, and have now approved of certain proposals. Authority had been given to the engineer to prepare plans and estimates.

HOLYHEAD PLANS.

Two vice-presidents of the L.M.S. Railway Company and the chief assistant to the president received a deputation on behalf of the Holyhead Urban Council a few days ago to consider suggestions likely to ensure the prosperity of the town. Mr. A. Preston Thomas asked whether better facilities could not be provided for fish buyers and curers in the packing and pickling of this fish equal to those provided by the Irish Free State for the same traffic. He suggested how provision could be made to meet this on Parry's Island.

Dock and Harbour Authorities' Association.

Annual Report.

At the Annual General Meeting of the Dock and Harbour Authorities' Association, held at the Caxton Hall, London, on February 23rd, the following Eighth Report of the proceedings of the Association were presented and adopted.

MEETINGS.

During the year, in addition to the Annual General Meeting of the Association, there have been eight meetings of the Executive Committee and eight meetings of Sub-Committees. The Association have been represented at three Deputations to Ministers, at numerous Conferences with Government Departments and meetings with other bodies. Thirty-one Circulars have been issued to Members in the year (a list of the principal ones is given on p. 160).

EXECUTIVE COMMITTEE.

Sir Hugh Bell, who had been Chairman of the Committee since the formation of the Association, relinquished the chair on being elected President for 1927. The Committee wish to record their high appreciation of the work he has done for the Association both since its formation and throughout his Chairmanship and Presidency.

Mr. C. F. Torrey (London) was elected Chairman in Sir Hugh's place and the Committee have now with deep regret to record his recent death. Mr. Torrey represented the London District and South Coast on the Committee. During his five years of service Mr. Torrey had taken great interest in the work of the Association, and in his year as Chairman he had devoted considerable time to its affairs. The Committee will greatly miss his wise counsel and wide experience in dock and harbour administration.

SUB-COMMITTEES.

The following Sub-Committees were appointed during the year:—

Railway Matters—Mr. J. H. Estill, Mr. E. Latimer, Mr. James Macfarlane, Mr. D. Ross-Johnson, Mr. L. A. P. Warner, and the Hon. Secretary, with Mr. J. D. Ritchie added for Railway Rates Inquiry

Factory Matters—Mr. Latimer, Mr. Macfarlane, Mr. Ross-Johnson, Mr. Warner, Mr. G. S. Maskall, and the Hon. Secretary, with Mr. Ritchie and Mr. E. A. Moorhouse added for the Factories Bill.

Customs Hours at Docks and Warehouses—Mr. D. J. Owen, Mr. Ross-Johnson, Mr. Warner, and the Hon. Secretary.

International Maritime Conventions—Mr. Roger Clayton, Major E. G. Finch, Mr. Ritchie, and the Hon. Secretary.

Duties, etc., of Harbour and Pilotage Authorities—Mr. B. L. Nairn, Major Finch, and the Hon. Secretary.

Subscriptions of Harbour, Conservancy, Irish Free State, and Pilotage Authorities—Mr. Torrey, Mr. Hollwey, and the Hon. Secretary.

Rating and Valuation Matters—Mr. D. O. Dunlop, Mr. Moorhouse, Mr. Ritchie, Mr. O. W. Young, and the Hon. Secretary.

Buoyage and Lighting—Cmdr. J. Whitla Gracey, R.N.R., Capt. F. W. Mace, R.N.R., Mr. D. Alan Stevenson, and the Hon. Secretary.

MEMBERS.

The Association this year comprised 45 Authorities, dealing with a tonnage (excluding Irish Free State and Pilotage, etc., Authorities not covered by the Board of Trade Returns) representing about 71 per cent. of the total tonnage of vessels with cargoes arriving at and departing from Ports of the United Kingdom.

BILLS IN PARLIAMENT—SESSION 1927.

The undermentioned Bills were amongst others considered by the Committee and steps were taken where necessary to protect the interests of Dock Authorities:—

I.—Bill which received the Royal Assent.—Landlord and Tenant (No. 2), Expiring Laws Continuance, Diseases of Animals, Poor Law, Road Transport Lighting, Unemployed Insurance.

II.—Bills which did not pass into Law.—Inspection of Dams, Embankments and Reservoirs, Local Government Franchise (Extension to Mercantile Corporations and Companies), Workmen's Compensation, Landlord and Tenant, Ouse Drainage.

LANDLORD AND TENANT ACT.

This Bill received Royal Assent on 22nd December.

Apart from making alterations in the general law of landlord and tenant the main object of the Act is to provide for the payment of compensation for improvements and goodwill to tenants of premises used for business purposes (Sections 1 and 4) or in certain cases for the grant of a new lease (Section 5) in lieu of such compensation (Circular 116).

Section 21 directs that proceedings under Part I. of the Act are to be taken in the County Court unless all parties agree that the claim or application shall be heard by the High Court. A matter commenced in the County Court is to be referred, unless the parties otherwise agree, to one of a panel of referees selected by a Reference Committee consisting of the Lord Chief Justice, the Master of the Rolls, the President of the Law Society and the President of the Surveyors' Institution.

The measure was considerably altered both in Committee and on report in the House of Commons. The Association and the Railway Companies' Association were successful in obtaining protection for the property of Statutory Bodies from a claim for compensation for goodwill under Section 4 in cases where the premises are required for the purposes of the Authority. Further protection was obtained from the provisions of Section 5 (right to a new lease in certain cases).

An important point arose owing to an amendment made in Committee to Clause 14 (Provisions as to covenants not to assign, etc., without consent) now Section 19. As the Bill was drafted the clause provided that in all leases which contained a covenant by the tenant not to assign without the consent of the landlord the covenant should be subject to a proviso that such consent should not be unreasonably withheld. This proviso is a common one in many leases and no objection was taken on that account. However, in Committee the clause was extended to provide that in the case of Building leases made for more than 40 years the consent of the landlord to an assignment should only be required during the last seven years of the term.

This raised a question of practical importance because in numerous cases Public Authorities grant building leases for more than 40 years and it would be undesirable that they should lose control over the class of tenant to be admitted upon their Estates.

The Association and the Railway Companies' Association succeeded by an amendment on Report Stage in getting the property (inter alia) Public Authorities and Statutory Companies excluded from the above-mentioned proviso.

Among the more important amendments made in the Bill by the House of Lords the following should be mentioned. In the first place Clause 9 which made void any contract made before or after the commencement of the Act by virtue of which a tenant would be directly or indirectly deprived of his right to obtain compensation or the grant of a new lease under the Act was struck out in Committee in the House of Lords, but was re-introduced on Third Reading in that House in a modified form by limiting its retrospective effect to such contracts as have been entered into after the 30th March, 1927. The amendment was in substance accepted by the House of Commons with the date altered to 8th February (Section 9 of the Act).

Secondly, by Section 21 the County Court is given original jurisdiction over proceedings under Part I. of the Act in lieu of the Tribunal which the Bill as introduced proposed to set up.

Then having regard to the amendments to Section 19 (Provisions as to covenants not to assign, etc.) a definition of Statutory Companies was inserted as follows:—

“The expression ‘Statutory Company’ means any Company constituted by or under an Act of Parliament to construct, work or carry on any gas, water, electricity, tramway, hydraulic power, dock, canal, or railway undertaking” (Section 26).

Harbours, Docks and Piers (Temporary Increase of Charges) Acts, 1920 to 1922.—By the Expiring Laws Continuance Act, 1927, which received the Royal Assent on 22nd December, these Acts are to be continued for another year, namely, to the 31st December, 1928.

Road Transport Lighting Act.—The Ministry of Transport in March circulated a Draft Road Traffic Bill for purposes of discussion and with a view to obtaining the greatest possible measure of agreement with regard to the amendment of the existing law relating to the traffic on roads.

The whole Bill was not introduced during the Session, but the question of lights on vehicles being an urgent one, Part II. of the Draft Bill was introduced as a separate measure by a private Member, and after passing Committee Stage in the Commons was taken up by the Government.

The object of the Act, which comes into force on 22nd April, 1928, is to simplify the law on the subject which was contained in eight general Acts, two Orders, and numerous local bye-laws (H. of L. Debates, 20th December, 1927, Vol. 69, Cols. 1170-71). In Committee in the House of Lords amendments were inserted (Section 1 (2)) to make it clear that the power to make Regulations applied to all the provisions of the Act, and that the Act is not to apply (Section 14 (1)) to railway locomotives, carriages and trucks, which generally have their own special lighting and are in frequent use in and about dock estates.

The Act received the Royal Assent on 22nd December.

DRAINAGE ENQUIRIES.

(a) Ouse Drainage Bill.—This Bill, although in the nature of a private Bill was introduced by the Minister of Agriculture and Fisheries and referred to a Joint Committee of both Houses of Parliament. The Bill contained a clause which sought to

enforce a specific contribution towards the cost of drainage work upon both the Conservancy Board and Dock Company at King's Lynn, on the ground that the drainage works would benefit the trade of that Port. This contribution was to be in addition to the amount which these bodies contribute as ratepayers within the drainage area.

The Joint Committee spent 16 days in considering the Bill, and reported on the 15th November that it was not expedient to proceed with the Bill.

(b) Royal Commission on Land Drainage in England and Wales.—The Report (Cmd. 2993) dated December, 1927, has now been published. Among the principal recommendations made are these:—That the general Drainage Law should be consolidated and amended—That a Central Drainage Authority be set up for each catchment area—That the Catchment Area Authority should have power to enter into arrangements with Navigation and other Authorities for the regulation of the main channel of the river.

Both (a) and (b).—From the statements made by the Minister of Agriculture in the House of Commons on 20th December on a motion relating to the state of agriculture it seems that the Government intend to re-introduce the Ouse Drainage Bill in the coming Session and to take action with regard to Drainage generally in the light of the Royal Commission's Report (H. of C. Debates, 20th December, 1927, Vol. 212, Cols. 3317-18).

In connection with the foregoing measures the thanks of the Association are due to Lord Clwyd, Sir Leslie Scott, Sir George Courthope and Mr. Smith-Carington.

FACTORIES (No. 2) BILL, 1926.

In the King's Speech it was announced that a Bill for the consolidation and amendment of the Factory Acts would be brought in. No Bill was introduced during the Session, but in the summer the Home Secretary stated that in the autumn he would set up a Conference to discuss the provisions of the Factories (No. 2) Bill, 1926, with a view to an amended Bill being introduced into Parliament in the Session of 1928.

The *ad hoc* Committee of the National Confederation of Employers' Organisations, on which the Association is represented (see 1926 Report, pp. 11 and 12), prepared a report on the Bill which was submitted to the Home Secretary last February.

The Report consisted of a general statement on the Bill as a whole, followed by a detailed and exhaustive commentary clause by clause.

Deputations in which the Association took part were received by the Home Secretary in July, one with the Railway Companies' Association on Clause 92, which makes certain of the provisions of the Factories Acts applicable to Docks and Warehouses, and the other with the Institution of Civil Engineers, the Federation of Civil Engineering Contractors and the Railway Companies' Association on Clause 94, which proposes to apply a number of factory requirements to building operations and engineering works.

The Home Secretary had previously received a Deputation from the Confederation, on which the Association was represented, at the end of June when the main issues involved in the Bill were put before him, and as a result the Conference above referred to was set up which has met at the Home Office throughout the autumn (Circular 124).

A Sub-Committee of eight was appointed from the *ad hoc* Committee to attend the Home Office Conference on behalf of employers when the general aspects of the Bill were being discussed.

Transport interests were represented at the General Conference on the Bill by Mr. Kenelm Kerr of the London and North Eastern Railway Company. Mr. Kerr throughout the enquiry kept in touch with the Association's officers, and the thanks of the Association are due to him and his colleague, Mr. I. B. Pritchard, Solicitor to the Metropolitan Railway, for the care and close attention which they devoted to mastering the intricacies of the Bill and putting forward the views of Dock as well as Railway Authorities. When Clauses 92 and 94 were under discussion and also Clause 21 relating to lifts and hoists, applied to warehouses by Clause 92 (2), the Association was directly represented at the Conference.

TONNAGE MEASUREMENT OF OIL TANK STEAMERS.

A question concerning the deduction of cofferdam spaces from the gross tonnage of a vessel was raised by the Committee with the Board of Trade respecting tank steamers built on the longitudinal principle. Those deductions can only be justified under Section 79 of the Merchant Shipping Act, 1894, as amended by Section 54 of the Act of 1906, if the spaces are adapted only for carrying water ballast, but it appears that they are used or capable of being used for other purposes also.

So far the Board of Trade are not prepared to alter their practice with regard to allowing these deductions, but if a further opportunity occurs the matter will not be lost sight of.

FACTORY AND WORKSHOP ACT, 1901.

Draft Regulations at Shipbuilding and Repairing Yards and at Dry Docks.—After the Chief Inspector of Factories had

met representatives of the interests concerned, including the Association, and considered the various objections, the Home Office issued a revised draft of these Regulations in September under cover of their letter No. 496236/9. The new draft meets the main points raised, but so far no Order has been made.

LEAD PAINT (PROTECTION AGAINST POISONING) ACT, 1926.

Lead Paint Regulations, 1927.—The draft Regulations issued on the 31st December, 1926, were circulated to Members in January, and as a result of replies received the Association lodged objections principally on the ground that Clause 3, which prohibited the dry rubbing down of all painted surfaces would extend to the scraping of paint on steel-work structures and fixtures, whether inside or outside buildings (Circular 103).

An Inquiry into the draft Regulations was held by Sir William Warrender MacKenzie, K.C., on 22nd and 23rd June, when the Association was represented, and the objections to Clause 3 were put forward by the Railway Companies, the Engineering and Allied Employers' National Confederation of Iron and Steel Manufacturers and the Association.

As a result of the Inquiry, Regulations were made by the Home Secretary on 6th September (The Lead and Paint Regulations, No. 847 of 1927), which came into force on 1st October, Clause 3 having been amended so as to allow the dry rubbing down or scraping of iron and steel work provided that dry sand paper shall not be used for preparing these surfaces.

RAILWAYS ACT, 1921.

Standard Charges—Other Sources of Revenue—Docks, Harbours and Wharves.—The Appeals to the Court of Appeal (*vide* 1926 Report, pages 17 and 18), by the Association and the Manchester Ship Canal Co., against the Judgment of the Railway Rates Tribunal dated 30th March, 1926, was heard by a Court consisting of Lords Justices Bankes, Scrutton and Atkin, on six days in January, 1927, and the Court delivered Judgment on 21st February, 1927, allowing the Appeals. (Circular 113).

In the course of his Judgment Bankes, L.J., said: "The Tribunal have for a reason which cannot in law be supported declined to take into consideration the matters submitted for their consideration by the appellants." And again: "The charges in each dock undertaking must be considered separately, and the statutory provisions regulating the undertaking must necessarily be taken into consideration and how the charges sought to be imposed can be supported."

Scrutton, L.J., said: "Parliament has set the Tribunal a very difficult task, which cannot be performed by treating all Docks (i.e., of one Railway Company) as one ancillary business to which one rate can be applied, without considering the particular facts and statutes and charges of each dock."

Following this Judgment the Railway Sub-Committee met the Railway Companies' Representatives at the Ministry of Transport to see if the questions raised in the Judgment of the Court of Appeal could be settled.

Nothing had resulted from this meeting when on 10th June the Tribunal gave notice that on 4th July they would finally settle the Schedule of Standard Charges and fix the appointed day.

With a view to ensuring that the Judgment of the Court of Appeal would be brought before the Tribunal, the Manchester Ship Canal Company gave notice that they would at the sitting on 4th July apply for a day to be fixed when the Tribunal should take into consideration the charges in respect of the businesses carried on by the Railway Companies ancillary or subsidiary to their railway undertakings in accordance with the provisions of Section 59 (4) of the Railways Act, 1921, and the decision of the Court of Appeal above referred to. The Committee decided to support the application.

The motion was dismissed on the ground that the Tribunal did not gather that they were then bound to consider the matter but only when the rates came up under the Act for revision. On 6th July the Tribunal finally settled the Schedules of "Standard Charges" and appointed the 1st January, 1928, as the "appointed day" when the Schedules are to come into operation.

The Committee felt that the protection which Section 58 (4) of the Railways Act, 1921, afforded would be of little value if the Judgment of the Court of Appeal was to be treated in this way without regard to what the Dock and Harbour Undertakings of the Railway Companies were or how the accounts should be kept. They therefore considered it essential that an Appeal should be lodged against the decision of the Tribunal which fixed the Standard Charges without having taken these matters into consideration.

The Manchester Ship Canal Company and the Association accordingly gave a joint notice of appeal from this decision of the Tribunal on the 23rd July (Circular 125).

While the Appeal was pending the President (Sir Hugh Bell) after conferring with Mr. Torrey (The Chairman of the Executive Committee) arranged a Conference with the Railway Companies' Representatives, and an agreement was arrived at which put an end to the litigation. The Railway Companies have undertaken to prepare their Dock Accounts for the year 1928 in accordance with the Statutory Powers applicable to their

Dock Undertakings and to furnish the Association with copies of the Accounts at the same time that they lodge them with the Railway Rates Tribunal for the purposes of the first review.

In addition they have undertaken to furnish the Association with plans of their principal Dock Undertakings prepared in accordance with the statutory provisions relating thereto (Circular 127).

ELECTRICITY SUPPLY ACT, 1926.

Central Electricity Board.—This Board, established under the above Act, whose duty is to supply electricity to authorised undertakers and to approve technical schemes submitted by the Electricity Commissioners, was appointed by the Ministry of Transport in February.

COMMITTEE ON INDUSTRY AND TRADE.

PORT FACILITIES FOR GREAT BRITAIN.

This Government Committee was set up with a view to assisting industry and commerce, and to this end the Association was asked to obtain information from members under three main heads:—

- (1) The rise as compared with pre-war conditions in Port Dues;
- (2) System of lay-out, efficiency of plant, and methods of handling and storing;
- (3) Cost of loading and discharging.

A great deal of interesting information dealing with the above was received from members and transmitted to the Committee (Circular 120).

DETERIORATION OF STRUCTURES EXPOSED TO SEA ACTION.

The Special Committee of the Institution of Civil Engineers appealed for further funds to enable them to complete their investigation into the deterioration of timber, metal and concrete structures when exposed to the action of sea-water. In asking for the renewal of subscriptions the Institute stated that an approximate sum of £1,100 per annum for the next five years is still required. The subscriptions hitherto received, including those from members of the Association, have amounted to about £725 per annum and therefore an additional sum of about 50 per cent. over and above the present subscriptions is required (Circular 121).

The response by members of the Association to this appeal has resulted in an increase of at least 50 per cent. over their previous subscriptions.

MARITIME CONVENTIONS.

- (1) Shipowners' Liability. (2) Mortgages and Liens.

The British Maritime Committee of the Comité Maritime International forwarded the final texts of the above-named Conventions, and no alteration from the previous draft has been made in the footnotes to Article 1 of the former and to Article 2 of the latter Convention which contain the reservations enabling the rights and powers of Dock and Harbour Authorities to be protected by the Confirmatory Act. The Confirmatory Bill may be introduced in the Session of 1928.

BUOYAGE AND LIGHTING OF COASTS.

The question of an International Agreement (page 24, 1926 Report) has been raised again, this time by a Committee of the League of Nations with the Foreign Office and the Board of Trade. The latter communicated with those interested, and have recently informed the Association that the Foreign Office reply to the questions is the same as before, viz., that there is no necessity for altering the Lighting and Buoyage system at present in force for the United Kingdom.

NATIONAL CONFEDERATION OF EMPLOYERS' ORGANISATIONS.

Having regard to the work of the Confederation in connection with the Draft Factory Bill and other matters, the Association have again given a contribution of Fifty Guineas towards their expenses.

KING'S BIRTHDAY.

The Association once more reminded the Treasury of the inconvenience caused to trade by the official celebration of His Majesty's Birthday by Customs and Excise Officers on a day in the middle of the week. A Saturday was again selected in 1927, and it is hoped that this will now become a settled practice.

POLLUTION OF RIVERS.

Attention was drawn to this subject in the House of Lords on the 18th July, when Lord Balfour, President of the Council, in stating that it was proposed to set up two Committees, said:—

"There are two bodies created. There is a body (Advisory Committee) which represents the two Departments (Health and Fisheries) concerned. That deals with administration, with all the things which are outside scientific research. There is another body entirely devoted to scientific research which, of

course, will co-operate and communicate with, and receive advice from, the first Committee, but which is entirely different, under a different Department, and with an entirely different personnel."

This being a matter which might affect navigation and other Dock and Harbour interests, a letter was sent to the Mercantile Marine Department of the Board of Trade.

The Board of Trade replied stating that Rear-Admiral C. E. Monro has been appointed as their Assessor to each of the two Committees to attend such meetings as may be necessary in relation to matters affecting the interests with which the Board are concerned.

MISCELLANEOUS.

Among other matters which have received attention during the year are:—

- British Engineering Standards Association—Draft Specification for Strand Steel Wire Ropes for Shipping Purposes; Draft Specification for Derrick Cranes (Circulars 118 and 123).
- Facilities for Coal Shipment at Ports (Circular 115).
- War Compensation Court—Claim against Government by a Member of the Association.
- Report of Crown Proceedings Committee (Cmd. 2842 of 1927).
- London Chamber of Commerce—Invitation to affiliate.
- Greenock Harbour—Finance Bill—Sugar Subsidy.
- Inquiries re Sea and Harbour Services for Bulgarian Government (Circular 119).
- Transport of Animals Order.
- Arrangement with Government—Dock Dues on Materials for Admiralty.
- Model Code of Harbour Bye-Laws—Petroleum Spirit.
- Carriage of Carbide of Calcium.
- Provisional Orders relating to Piers and Harbours.
- Safety First Regulations—Home Office Circular, 16th May, 1927.
- Rating and Valuation Act, 1926—Rating of Machinery.
- Bye-Laws as to Boats Plying for Hire.
- Dry Docking Vessels at Ports of the United Kingdom—Information for New South Wales Government.
- Stevedoring—Sunderland Corporation Bill.
- Dock Police—Exchequer Grant (Circular 131).
- Wreck-raising Powers.

PRINCIPAL CIRCULARS ISSUED IN 1927.

- Lead Paint (Protection against Poisoning) Act, 1926.
- Draft Regulations and Circulars issued by the Home Office (No. 103).
- Bills in Parliament—Session 1926 (Nos. 105 and 110).
- Private Bills—Session of 1927 (No. 108).
- Oil in Navigable Waters Act, 1922—Pollution of Coastal Waters by Oil (Nos. 112 and 117).
- Railways Act, 1921—Schedule of Standard Charges—Other Sources of Revenue, Docks, Harbours and Wharves (Nos. 113, 125, 127).
- Facilities for Coal Shipment at Ports (No. 115).
- Landlord and Tenant (No. 2) Bill (No. 116).
- British Engineering Standards Association.
- Draft Specifications.
- (1) Round Strand Steel Wire Ropes for Shipping Purposes.
- (2) Derrick Cranes. (Nos. 118 and 123).
- Inquiries as to Sea and Harbour Services—Bulgarian Government (No. 119).
- Committee on Industry and Trade—Port Facilities for Great Britain (No. 120).
- Committee of the Institution of Civil Engineers on Deterioration of Structures exposed to Sea Action (No. 121).
- Bills in Parliament, Session 1927 (No. 124).
- Institute of Transport—Prize on a subject relating to Water Transport (No. 126).
- Compressed Air Explosion at Deptford Green (No. 129).
- Dock Police—Exchequer Grant (No. 131).

ACCOUNTS.

The expenditure for the year amounts to £2,280 14s. 11d., of which £2,169 11s. 1d. is payable by members of the Association.

The special expenditure incurred on appeal to the Court of Appeal and in proceedings before the Railway Rates Tribunal has amounted to £2,814 15s. 3d., which, after allowing for the £1,000 charged against the 1926 accounts, leaves £1,814 15s. 3d. outstanding. Of this latter amount a sum of £750 has been charged to this year's accounts, leaving a balance of £1,064 15s. 3d. to be met in future years.

The Committee do not recommend any levy for 1927 and as will be seen a debit balance of £44 16s. 1d. will be carried forward to 1928 (Rule 12 (6)). During 1928 it is proposed to repay a considerable part of the £1,750 kindly advanced by certain Authorities (page 26 of 1926 Report) to meet the special Railway expenses.

The Committee have fixed the subscriptions payable under Rule 12 (4) by Harbour, Conservancy, Pilotage and Free State Authorities for the year 1927, on a gross income basis with a minimum subscription of Five Guineas.